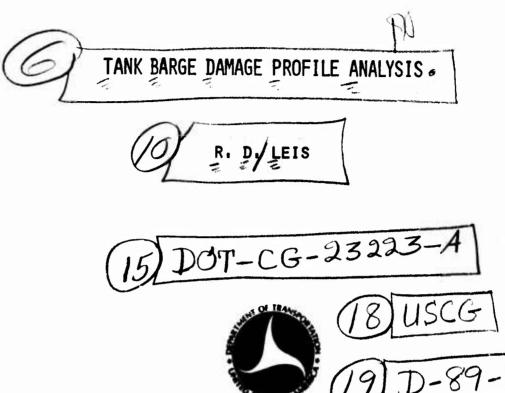
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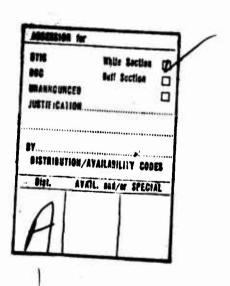
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DEPARTMENT OF TRANSPORTATION UNITED STATES COAST GUARD

Office of Research and Development Washington, D.C. 20590

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TANK BARGE DAMAGE PROFILE ANALYSIS

by

R. D. Leis

1.0 INTRODUCTION

This report presents the results of one portion of the program entitled "Tank Barge Damage Survey/Temporary Repair Study" (Contract No. DOT-CG-23223-A, Task 16) conducted by Battelle's Columbus Laboratories for the U. S. Coast Guard. This program is the second phase of a three-phase program to develop the information necessary to evaluate temporary repairs to tank barges. Phase I, conducted by the National Maritime Research Center, Galveston, Texas, consisted of a "state-of-the-art" study of tank barge temporary repairs. Phase II had three objectives.

- (1) To analyze the effectiveness of double barriers in preventing cargo tank penetration in tank barges.
- (2) To analyze and define the profile of damages which occur to tank barges.
- (3) To develop suitable test procedures for the compilation of performance parameters of temporary repair materials which are pertinent to the assessment of their adequacy in use. These will be recommended for execution in Phase III of the overall tank barge temporary repair program.

This report presents the results of Item (2) above--the analysis of tank barge damage profiles.

2.0 SOURCE MATERIAL

The source material upon which this analysis is based is a compilation of over 700 special damage survey reports submitted to Coast Guard Headquarters by field inspection units (see Exhibit 1). The damages reported were those observed during approximately one year on scheduled inspections and special examinations; as, for example, would follow a casualty or major repair activity.

EXHIBIT 1. SAMPLE DAMAGE SURVEY SHEET

Ve	sel Name	Official Number
1.	Profile Section	Cross Section
1		57805 BOTT
	Ветом	
	(Indicate damage on above sketches)	
2.	Type of damage (holed, fractured, wa	sted, etc.) URSET
3.	Location of center of damage	
	a. Longitudinally from nearest en	d of barge 35
	b. Vertically from bottom	
	c. Longitudinal extent of damage	17
	d. Vertical extent of damage	
	e. Transverse extent of damage	
4.	Single or double sided	Double
	a. Was side cargo containment bou	ndary penetrated?
	b. Would the construction of 24" prevented the side cargo conta from being penetrated?	
5.	Single or double bottom	Dou ble
	a. Was bottom cargo containment be	oundary penetrated: <u>No</u>
	b. Would the construction of 24" of prevented the bottom cargo conbeing penetrated?	
6.	The last cargo carried in the tank as cargo at time of damage (if info is	1 / A
7.	Probable cause of damage	CROUNDI N'G
8.	Cost of permanent repairs/weight of	replacing materials 2000/3900=

The information contained in these survey forms was analyzed and each separate damage incident was coded onto data sheets. An example of the data sheet and coding instructions is given in Appendix A. These data were then merged with the Vessel File (maintained in G/MIS) for all barges in which damages were reported. This was necessary to obtain a complete data base which included physical barge descriptors—such as key dimensions—which were necessary for the immediate analysis purposes or may be necessary for future analyses. Appendix B contains the data record layout which resulted. The data base submitted to G/MIS is in accordance with this layout. A total of 1,289 separate damage incidents survived this process—after normal attrition due to incomplete survey forms or the lack of a vessel "match" with the Vessel File.

These data were loaded onto the INFONET* system for analysis using the SALTS (Safety Analysis Logic Tree System) developed for the Coast Guard by Battelle. SALTS is an on-line interactive computerized system designed to facilitate the analysis of data. The system provides the analyst with the means to create an analytical tool, based on fault-tree logic and database sort criteria, for characterizing the contents of the data. This tool is created by the user in the form of a "tree" whose structure is based on nodes connected by logic gates.

By comparing the data elements of Appendix A with those supplied in Exhibit 1, it will be noted that considerably more information was coded than was specifically submitted on the survey forms. These added elements were desirable for a more complete analysis capability. They were, in most cases, deduced from the totality of information provided on the survey reports. For example, end-void information was not supplied. However, if the barge sustained a hole in the end with no tank penetration, the existence of an end void can be assumed with reasonable certainty.

Other desired data elements, however, were not supplied and could not be deduced with certainty. For example, the transverse location of damage was not requested. A rake end on a barge caused problems in locating

(17)

^{*} SALTS was implemented on Computer Science Corporation's INFONET System.

INFONET is an acronym coined by CSC to denote information network.

end damage. Many times key questions were not answered. These data deficiencies, when combined with similar data deficiencies for some vessels in the Vessel File (such as the lack of key dimensions), resulted in something less than a comprehensive and accurate data base. The project staff attempted to compensate for some of these deficiencies—again by inference. The net result is a data base which is compromised to some degree.

This discussion is not given to dilute the reader's confidence in the following analysis results. However, he is cautioned to observe the trends discussed and not to dwell on the accuracy of any specific number. In general, these inaccuracies will be on the order of 1 to 2 percent with the exception of analyses which compound inferences. In these latter cases, special notice will be given.

3.0 CONCLUSIONS

The analyses performed in this task were aimed at (1) generating tank barge damage information pertinent to the understanding of tank barge damages and (2) developing damage parameters pertinent to the establishment of test procedures for temporary repairs. As such, there are no specific conclusions. Rather, the findings are embodied in the analyses performed as discussed in the following section.

4.0 PROGRAM ANALYSES

The general approach used in selecting the analyses to be performed in this task was to analyze the barge damage data in general form and move toward the specific forms. Appendix D, a compilation of SALTS results*, is arranged in this manner. Exhibits D-1 through D-8 examine the incidence of all damage, hull ruptures, cracks, and holes with respect to the bow and stern for various areas of the barge. Exhibits D-9 through D-12 examine side damage in a longitudinal and vertical location matrix for hull ruptures, cracks, holes, and wasted through damage types, respectively. Exhibit D-13

y Con June

^{*} The event pool used for these analyses is given in Appendix C.

examines the crack lengths sustained; Exhibit D-14 examines the area of holes sustained; and Exhibit D-15 examines the areas of wasted through damage sustained.

In general, all analyses reference a specific area of a barge-such as side plane. These areas are defined in Exhibit 2. In this exhibit, the "codes" given in parenthesis correspond to the names used in the exhibits in Appendix D. For example, PAS means Plane Area Side. In the discussions which follow, these codes will not be used. They are introduced here only for the reader who understands SALTS and wishes to examine Appendix D for his own analytical purposes.

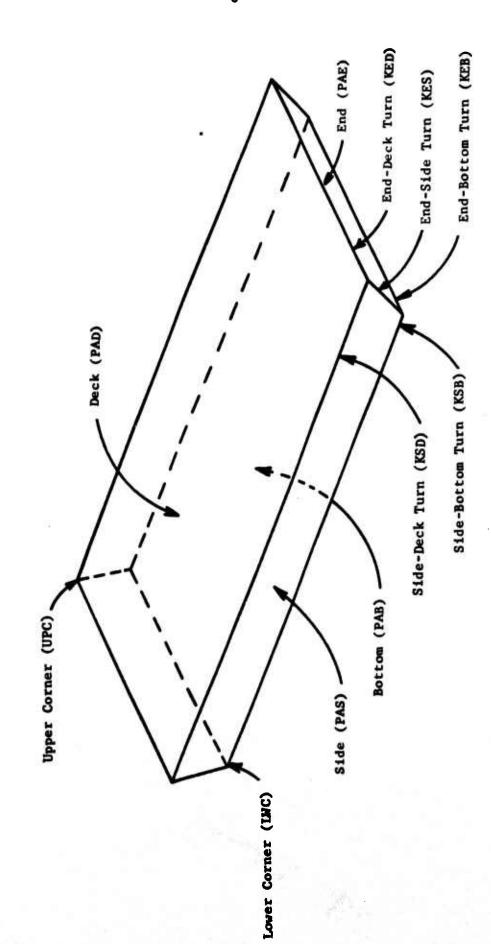
4.1 BARGE DAMAGE FREQUENCY BY TYPE AND LOCATION

The first set of analyses was aimed at defining the basic types of damage and their occurrence with relation to various areas of the barge (Exhibits D-1 through D-8). Exhibit 3 summarizes these results. In this exhibit, the number of incidents of reported damage and subsequent hull rupture to each major barge area is given. In addition, the hull-rupture incidents are further subdivided into basic types: cracks and fractures, holes, and wasted-through areas. Each of these damage types was further analyzed to determine their frequency of occurrence in percentage intervals of the barge side profile.

Exhibits 4 and 5 were constructed from Exhibit 3. These exhibits show, in graphic form, the relative frequency of damage and hull rupture which occur in major barge areas. They reflect the dominance of damage to planes—in terms of both reported incidents and hull ruptures. The knuckles, or intersections of basic planes, however, sustain sufficient damage for concern in identifying the application environment for temporary repairs.

Exhibit 6 shows the distribution of damage incidents and their components with relation to the side profile of the barge. For example, approximately 30 percent of all damages are incurred within the first 10 percent of the barge. This is composed of the following:

EXHIBIT 2. TANK BARGE DAMAGE AREAS -- DEFINITIONS USED IN SALTS ANALYSES

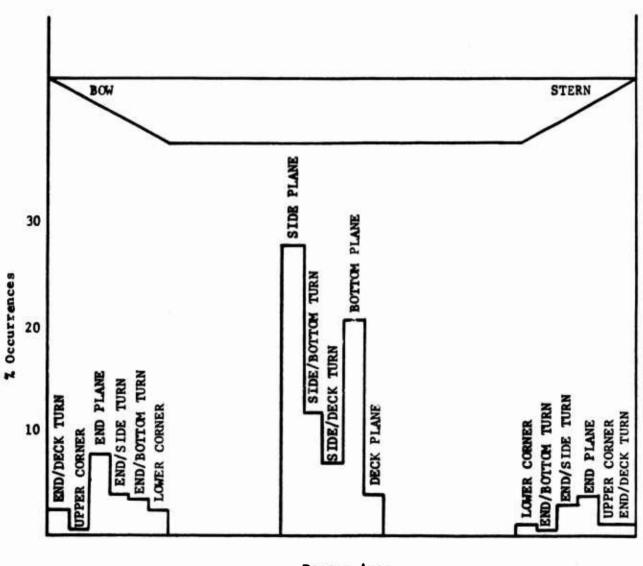


DAMAGE AREA DEFINITIONS

EXHIBIT 3. TANK BARGE DAMAGE PROFILE--SUMMARY LOCATIONS BY TYPE OF
DAMAGE AND BARGE AREA DAMAGED
Number of Incidents with Centerline Location in Specified
Interval--Intervals are Percent of Barge Length Referenced
from Bow

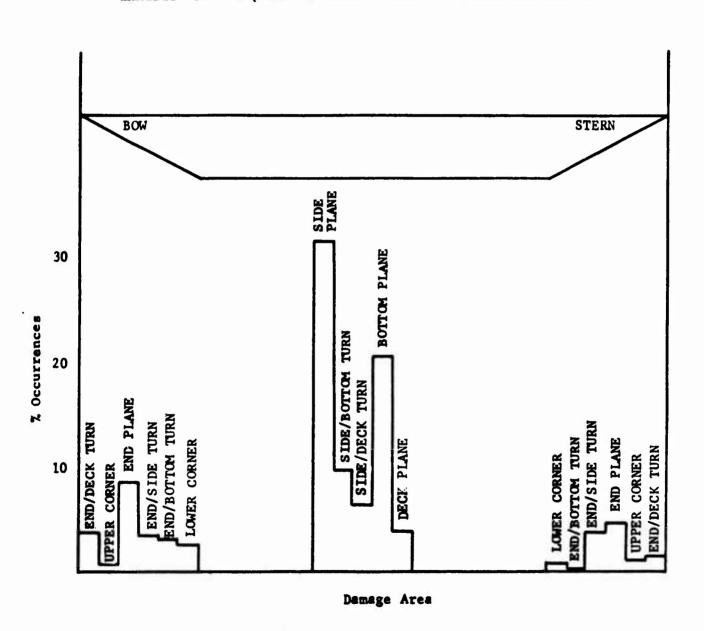
		Total Number of					Percor					
Type of Demage	Barge Area Damaged	Incidents	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-10
All incidents	A11	1289	351	148	104	87	95	48	44	46	62	170
Mull ruptures	Ditto	724	225	84	59	42	47	25	26	28	36	113
Cracks/fractures	"	419	119	51	34	22	28	17	14	16	18	74
Holes	**	331	117	39	27	22	17	10	14	10	19	41
Wasted through		21	5	••	2	2	5	1	1	2	••	2
All incidents	Side plane	338	78	44	35	28	2.9	17	11	16	22	32
Mull ruptures	Ditto	226	57	28	28	13	16	10	9	10	17	24
Cracks/fractures	н	152	35	20	15	9	10	9	6	7	9	19
Holes Vested through	10 10	#3 4	24 2		13	6	4 2	3	5	3	•	6
All incidents	9-22	246	17	47	33	36	29	15	17	12	15	12
Mull ruptures	Bottom plane Ditto	128	ii	27	15	19	13	7	10	7	7	7
Cracks/fractures	"	34		13	8	6	8	i	.5	Ä	á	í
Holes	•	71	i	15	6	14	Ă	5	Ĭ	2	Ä	6
Wasted through	Ħ	9	1	••	2	1	2	ĭ	1	ī	••	
All incidents	Deck plane	47	10	5	6	3	. 3		1	4	5	5
Mull ruptures	Ditto	25	3	2	ĭ	ĩ	. 3	••	i	3	ź	ś
Cracks/fractures	н .	16	2	ī	ī		ž			2	2	3
Holes	•	11	3	2		1	1		1	1	1	
Wasted through	•			••				••	••		••	
All incidents	End plane	134	86	7		••		••			••	41
Bull ruptures	Ditto	86	56	1	••							29
Cracks/fractures		47	30	1				•-				16
Roles	H	42	30	••	••				••	••		12
Wested through	•	2					••					2
All incidents	Turn-side/bottom	141	12	24	15	10	23	9	10	8	11	10
Hull ruptures	Ditto	93		12	11	2	•	4	4	5	5	4
Cracks/fractures	- "	45	3	7	7	1	5	3	2	3	2	3
Holes	•	. 37	5	6	6	1	6	2	2	2	2	2
Wasted through		1										
All incidents	Turn-side/deck	80	15	5	12	10		5	3	4	5	5
Mull ruptures	Ditto	43 30	7	1	4	7	4	3	1	l	4	2
Cracks/fractures Holes	. 16	13	2	ī	2		i		1		3	i
Wasted through		2				1		••		1	••	
All incidents	Turn-end/side	78	43	2	1	••	••	••	••		••	32
Bull ruptures	Ditto	48	23			••	••					25
Cracks/fractures	••	31	13				••					18
Holes	H	18	11				••		••			7
Wested through	**				•-							••
All incidents	Turn-end/deck	39	28	••	••	••			••		••	11
Mull ruptures	Ditto	33	24	••	••							9
Cracks/fractures	**	20	14		••	••	••			••		6
Holes	**	15	12	••				••				3
Wasted through	=	••		••	••	••			••		• •	••
All incidents	Turn-end/bottom	49	31		2						1	6
Mull ruptures	Ditto	21	16	5			••				••	
Cracks/fractures		7 18	5 14	2 4								••
Noles Wasted through		i	ì				••					••
	Managaran	18	7			••	••					
All incidents Mull ruptures	Upper corner Ditto	10	4		••				•••		••	11
Cracks/fractures	DIEEG	9	3	••								6
Boles		2	ĩ		••	••		• •			• •	ĭ
Wasted through	90	••	••	••	••	••	••	••			••	
All incidents	Lower corner	37	23	5		••	••	••	-		••	7
Mull ruptures	Ditto	2:1	13	4								Ä
Cracks/fractures	•	7	4	2		••		••				1
Moles	H	13		2	••		••	••		••	••	3
Wasted through		1	1				••	••	••		••	
11 incidents	Hassive area	12	1	1			3	2	1	2	1	••
Wil ruptures	Ditto	•	1	1			2	1	1	2	1	
racks/fractures	"	5	1	1	••	••		1	1		1	
oles Assted through		5 1		1			1		1	2		
												••

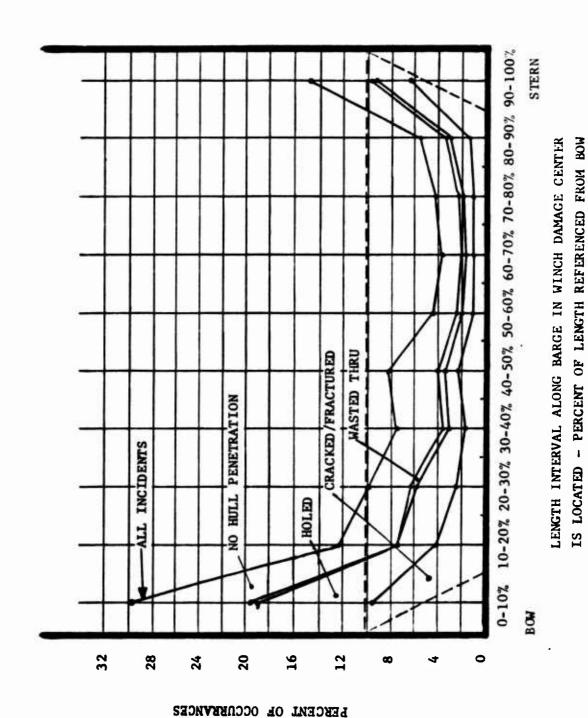
EXHIBIT 4. FREQUENCY OF DAMAGE IN MAJOR BARGE AREAS



Damage Area

EXHIBIT 5. FREQUENCY OF HULL RUPTURE IN MAJOR BARGE AREAS





GRAPH SHOWING DISTRIBUTION OF DAMAGE INCIDENT CENTER LOCATION ALONG BARGE - BY TYPE OF DAMAGE EXHIBIT 6.

- Cracks/fractures ≈ 8.7 percent
- Holes ≈ 8.7 percent
- Wasted through. ≈ 0.2 percent
- Dents/Upsets, etc. ≈ 12.6 percent

 Total ≈ 30 percent.

This exhibit shows the expected pattern of high incidence near the ends of the barge-with heavy bias toward the bow--diminishing as one approaches the barge mid-section. This pattern holds not only for all damage, but also for each specific type of damage--with the exception of wasted-through hull rupture. This is because this type of damage is most prevalent on the bottom of the barge due to corrosion and erosion. This is not as location oriented as other, more dynamic damage types where frequencies would be expected to increase as the exposure is increased--as, for example, bow and side exposure to dynamic forces of fleeting and locking, as well as collision casualties.

Exhibit 6 also shows the trend of diminished severity of damage on the mid-section as compared to the end portions of the barge. In the bow 10 percent interval, nearly two-thirds of all damages resulted in a hull rupture; whereas, in the mid-section, this ratio drops to approximately one-half. This may also be explainable by the types of damages reported. Wastage and severe distortions become repairable defects prior to becoming hull ruptures-i.e., the damage may be progressive. Dynamic failures, however, do not have this characteristic.

These exhibits show the types of damages and their location—yielding insight into the types of temporary repairs which might be made, where they might occur, and the damage environment in which they must survive. This latter is important to assessing the adequacy of any temporary repair and must, therefore, be considered in defining data needs and test procedures for temporary repair materials.



4.2 FURTHER DEFINITION OF SIDE-DAMAGE LOCATIONS

Because of the dominance of side damage, this damage mode was investigated further in terms of a longitudinal and vertical matrix showing frequency of various side-damage types.* Exhibits D-9 through D-12 show the SALTS results of these analyses. Summary data are shown in Exhibits 7 through 9 for hull ruptures, cracks/fractures, and holes, respectively. Wasted-through damage is not displayed because of the low frequency of occurrence on the side plane (four cases).

In Exhibits 7 through 9, the abscissa is again percentage intervals of the barge-side profile. The ordinate, however, is given in feet. While a percentage display might be useful, such was not possible owing to the number of cases in which a barge depth dimension was lacking in the Vessel File. Furthermore, absolute vertical location dimensions may, in fact, be more meaningful because of draft restrictions on most barge routes which tend to make barge depth fairly uniform across the total population.

These exhibits do not display any particular unique damage profile. As might be expected, cracks and fractures (Exhibit 8) seem to
cluster near the ends and along the upper portion of the barge. This is
reasonable because of the exposure of these areas to the impact forces which
produce these failures.

Holes, on the other hand, tend to be more uniform with a cluster tendency at the ends and along the bottom half of the barge. Again, this is reasonable because of striking, submerged, or floating objects which can produce this type of damage.

From the standpoint of temporary repair, however, these differences are of little consequence. It appears that, regardless of the specific damage to be repaired, equal consideration of water chemical and abrasion resistance and hydrostatic pressure resistance must be given because of the incidence of all damages expected below the water line.

^{*} It should be mentioned that similar matrix evaluations for other areas, while perhaps desirable, were not possible due to the lack of appropriate data.

•	1						 		1	
Over 10.0	13.3	3.4	2.9	1.7	2.9	7.0	1.3	1.3	0.8	2.1 /
7.5-10.0	بر برد	1.7	2.9	8.0	1.7	8.0	0.4	8.0	2.5	0.8/
5.0-7.5	4.6	1.7	2.5	3	0.4	0.8	0.4	8.0	2.1	2.8
2.6-5.0	6.3	2.5	2.5	0.8	1.7	1.3	0.8	1.3	0.8	2,9
0-2.5	2.9	2.5	0.8	0.8	0.0	0.4	0.8	0.0	0.8	/1.3
	0-10%	10-20%	0-10% 10-20% 20-30% 30-40% 40-50% 50-60% 60-70% 70-80% 80-90% 90-100%	30-40%	40-50%	209-05	201-09	70-80%	80-90%	90-100
BOW	3									STERN

INLEKAVT - EEET AEKLICVT DISLVNCE

LENGTH INTERVAL ALONG BARGE -- PERCENT OF LENGTH REFERENCED TO BOW

MATRIX SHOWING DISTRIBUTION OF HULL RUPTURES ON SIDE PLANE

EXHIBIT 7.

Cells Indicate Percent of Total Incidents of Side Hull Ruptures Occurring in Specified Side Zones

()

0-107 10-207 20-307 30-407 40-507 50-607 60-707 70-807 80-907 90-100% 0.0 9.0 0.0 9.0 0.0 0.0 0.0 9.0 1.9 Over 10.0 7.5-10.0 0-2.5 5.0-7.5 2.6-5.0

> INTERVAL - FERT VERTICAL DISTANCE

BOW

LENGTH INTERVAL ALONG BARGE -- PERCENT OF LENGTH REFERENCED TO BOW

STERN

EXHIBIT 8. MATRIX SHOWING DISTRIBUTION OF CRACKS/FRACTURES ON SIDE PLANE

Cells Indicate Percent of Total Incidents of Side Cracks/Fractures Occurring in Specified Side Zones

(1/)

	0.0	3 4	2.3	0.0	0.0	1:1	2.3	1
7	3	1	-	-		1:1	0.0	3.4
3.7	2.3	9.4	0.0	:	1			:
+	:	3 4	2.3	1.1	0.0		0.0	1
5.4	1	2	:	-	-	1:1	1.1	2.3
5.7	3.4	3.4		2:3	1	1_	00	6
	7. 2 0.0 1.1 0.0 0.0 1.1 0.0 2.2	0	::	0.0	0.0	1.1	0.0	2:3

BOM

LENGTH INTERVAL ALONG BARGE -- PERCENT OF LENGTH REFERENCED TO BOW

EXHIBIT 9. MATRIX SHOWING DISTRIBUTION OF HOLES ON SIDE PLANE

Cells Indicate Percent of Total Incidents of Side Holes Occurring in Specified Side Zones

(A) (F)

4.3 HULL-RUPTURE EXTENT

Another significant damage profile parameter required for the development of test procedures for temporary repair materials is the extent of the hull rupture--or size of the hole over which the temporary repair must maintain water-tight integrity and, perhaps, provide for structural continuity. Therefore, hull ruptures were examined to determine their size characteristics. Crack lengths were taken to be the diagonal of a rectangle containing the crack. Holed damage and wasted-through damage were taken to be the area of the rectangle containing the rupture.

Exhibits D-13, D-14, and D-15 are the SALTS results of these analyses. Exhibit 10 summarizes the results of the crack length investigation. As can be seen, approximately one-third of all cracks are less than one-foot long. However, this is on the low side--owing to the large number of cracks for which appropriate dimensions were not supplied in the survey reports. If it is assumed that the "unknown" category is distributed proportionately over the known length intervals, the percentage of cracks under one foot in length is over 50 percent. This length is highlighted because it would appear that if the cost and complexity of test requirements for temporary repairs to cracks is highly sensitive to the length of the crack, it would be reasonable to concentrate on the small ones. Contacts with barge industry representatives have also indicated that these are likely candidates for temporary repair. Larger cracks will generally be the result of more extensive damage which requires permanent repairs.

Exhibit 11 summarizes the results of the investigation of the area of holed and wasted-through damage. Again, the dominance is at the small end--under one square foot. While there is a clustering of data at the larger end, these must be largely discounted because they generally occurred in the presence of more massive damage--not all of which was rupture area. For example, a damage might have been termed "dented and holed" with the damage dimensions given in the survey reports applicable to the entire distorted area--not the extent of the rupture itself. Therefore, while the precise values cannot be determined, it is reasonable to assume that the



EXHIBIT 10. CRACK LENGTH--FREQUENCY OF OCCURRENCE BY SPECIFIED LENGTH INTERVALS

Crack Length,	Percent of Crack Occurrences
Under 1	31.44
1-3	11.01
3-6	6.43
6-10	3.91
Over 10	9.63
Unknown	37.87

EXHIBIT 11. DAMAGE AREA--FREQUENCY OF OCCURRENCE OF DAMAGE TYPES IN SPECIFIED AREA INTERVALS

Area,	Percer	t of Occurences
_ft ²	Holed	Wasted Through
Under 1	28.24	22.73
1-2	2.89	
2-3	2.31	
3-5	4.60	9.10
5-10	8.92	4.55
10-100	22.47	45.47
Over 100 + unknown	29.70	18.20



proportion of actual hull rupture of less than one square foot area is considerably greater than depicted in Exhibit 11.

Therefore, concentration on the small area openings should receive highest priority should compromises on the scope of the temporary repair material tests be required.

(22)

APPENDIX A

TANK BARGE DAMAGE CODE SHEET
AND EXPLANATIONS

() At

TANK BARGE DAMAGE SURVEY DATA FORM

1.	Vessel ID(1-8)						
							T
2.	Case Incident (9-10)						
3.	Type of Damage(11-12)=C-Cracked/Fractured U-Holed D-Deformed/Dented/Upset/Set In W-Wasted T-Wasted Through U-Unknown						
4.	Damage Area=S-Side B-Bottom D-Deck E-End R-Rake N-Stern Notch I-Internal Bulkhead Face Only(13)	_	_	_	_	_	
	Knuckle/Corner(14-16)						
5.	Damage Center Location Reference End(17)=B-Bow S-Stern U-Unknown					_	
6.	First Damage Type - Center Location Longitudinal from End(18-21)						
	Vertical from Bottom(22-24)						
	Transverse from Center Line(25-27)						
	First Damage Type - Extent Longitudinal (28-31)						
	Vertical(32-34)						
	Transverse (35-37)						
7.	Second Damage Type - Center Location Longitudinal from End(38-41)						
	Vertical from Bottom(42-44)						
	Transverse from Center Line(45-47) Second Damage Type - Extent						
	Longitudinal (48-51)						
	Vertical(52-54)						
	Transverse (55-57)						
8.	Double Barrier=Y-Yes N-No U-Unknown Side(58)					•	
	3148(30)						
	Bottom(59)						
		_					
9.	Bottom(59)	-		_		_	
9.	Bottom(59) End(60) Tank Penetrated=Y-Yes N-No/Threatened U-Unknown X-No/Not Threatened	-		_	· —	_	
9.	Bottom(59) End (60) Tank Penetrated=Y-Yes N-No/Threatened U-Unknown X-No/Not Threatened Side(61)	-		_	· -		
9.	Bottom(59) End (60) Tank Penetrated=Y-Yes N-No/Threatened U-Unknown X-No/Not Threatened Side(61) Bottom(62) End (63) Double Barrier Prevent Tank Penetration=Y-Yes N-No/Threatened P-Possible U-Unknown X-No/Not Threatened blank-Already Double Barrier				· -	- -	
	Bottom(59) End(60) Tank Penetrated=Y-Yes N-No/Threatened U-Unknown X-No/Not Threatened Side(61) Bottom(62) End(63) Double Barrier Prevent Tank Penetration=Y-Yes N-No/Threatened P-Possible U-Unknown X-No/Not Threatened blank-Already Double Barrier Side(64)			-	· 		
	Bottom(59) End (60) Tank Penetrated=Y-Yes N-No/Threatened U-Unknown X-No/Not Threatened Side(61) Bottom(62) End (63) Double Barrier Prevent Tank Penetration=Y-Yes N-No/Threatened P-Possible U-Unknown X-No/Not Threatened blank-Already Double Barrier Side(64) Bottom(65)			 	· —	- - -	
	Bottom(59) End (60) Tank Penetrated=Y-Yes N-No/Threatened U-Unknown X-No/Not Threatened Side(61) Bottom(62) End (63) Double Barrier Prevent Tank Penetration=Y-Yes N-No/Threatened P-Possible U-Unknown X-No/Not Threatened blank-Already Double Barrier Side(64) Bottom(65) End (66)				-	-	
10.	Bottom(59) End (60) Tank Penetrated=Y-Yes N-No/Threatened U-Unknown X-No/Not Threatened Side(61) Bottom(62) End (63) Double Barrier Prevent Tank Penetration=Y-Yes N-No/Threatened P-Possible U-Unknown X-No/Not Threatened blank-Already Double Barrier Side(64) Bottom(65) End (66) All (67)	-		-			
10.	Bottom(59) End (60) Tank Penetrated=Y-Yes N-No/Threatened U-Unknown X-No/Not Threatened Side(61) Bottom(62) End (63) Double Barrier Prevent Tank Penetration=Y-Yes N-No/Threatened P-Possible U-Unknown X-No/Not Threatened blank-Already Double Barrier Side(64) Bottom(65) End (66) All (67) Tank Loaded When Damaged(68)=Y-Yes N-No U-Unknown X-Not Applicable			-			
10.	Bottom(59) End (60) Tank Penetrated=Y-Yes N-No/Threatened U-Unknown X-No/Not Threatened Side(61) Bottom(62) End (63) Double Barrier Prevent Tank Penetration=Y-Yes N-No/Threatened P-Possible U-Unknown X-No/Not Threatened blank-Already Double Barrier Side(64) Bottom(65) End (66) All (67) Tank Loaded When Damaged(68)=Y-Yes			-		- - - - -	
10. 11.	Bottom(59) End (60) Tank Penetrated=Y-Yes N-No/Threatened U-Unknown X-No/Not Threatened Side (61) Bottom(62) End (63) Double Barrier Prevent Tank Penetration=Y-Yes N-No/Threatened P-Possible U-Unknown X-No/Not Threatened blank-Already Double Barrier Side (64) Bottom(65) End (66) All (67) Tank Loaded When Damaged (68)=Y-Yes N-No U-Unknown X-Not Applicable Cause of Damage (69)=F-Structural Failure C-Collision R-Ramming G-Grounding H-Hit Submerged Object A-Cargo Action						
110. 111. 12.	End (60) Tank Penetrated=Y-Yes N-No/Threatened U-Unknown X-No/Not Threatened Side (61) Bottom(62) End (63) Double Barrier Prevent Tank Penetration=Y-Yes N-No/Threatened P-Possible U-Unknown X-No/Not Threatened blank-Already Double Barrier Side(64) Bottom(65) End (66) All (67) Tank Loaded When Damaged (68)=Y-Yes N-No U-Unknown X-Not Applicable Cause of Damage (69)=F-Structural Failure C-Collision R-Ramming G-Grounding H-Hit Submerged Object A-Cargo Action S-Service/Wear O-Other U-Unknown						
11. 11. 12.	End (60) Tank Penetrated=Y-Yes N-No/Threatened U-Unknown X-No/Not Threatened Side (61) Bottom(62) End (63) Double Barrier Prevent Tank Penetration=Y-Yes N-No/Threatened P-Possible U-Unknown X-No/Not Threatened blank-Already Double Barrier Side (64) Bottom (65) End (66) All (67) Tank Loaded When Damaged (68)=Y-Yes N-No U-Unknown X-Not Applicable Cause of Damage (69)=F-Structural Failure C-Collision R-Ramming G-Grounding H-Hit Submerged Object A-Cargo Action S-Service/Wear O-Other U-Unknown Cost of Repair (70-73)						

15/

TANK BARGE DAMAGE SURVEY DATA FORM - CODING EXPLAINATION/RULES

TBDSDF	TBDSDF Que	Question	Correspond	Corresponding Inspection	
No.	General	Detail	No.	Question	Explaination
-	Vessel ID		N/A	Official Number	 Code in CCl-2 either DN (document number) or CG (Coast Guard) Code in 3-8 official number - always 6 digits
8	Case Incident		3 .	profile diagram location of damage	 determine individual damages for one barge (within the same sequence no) and number incident sequentially starting with 01 in CC 9-10 always zero fill if number is less than 10
<u>س</u>	Damage Type	·	2	Type of Damage	 in cc 11-12 left justified code types of damage from general to specific. if only one type leave CC 12 blank and all of question 7 blank
					• Code the following letters for inspection report answers H-holed, punctured, pinhole C-cracked, fracture, hairline D-leformed, indented, dented, upset (plate), set in (plate), distorted W-general wastage, wasted, wear and tear that does not penetrate barrier T-wastage that penetrated through barrier U-if question is not answered, or answered improperly
4	Damage Area	Face only	3	profile diagram location of damage	 answer in CC 13 only if damage is limited to one surface respond with S(side), B(bottom), D(deck), E(end), R(rake), N(stern-tug knotch), I(internal bulkhead, walls of cargo tanks)
45		Knuckle Corner	3 1	profile dia- gram location of damage	 answer in CC 14-16 if datage covers more than one surface. respond with combination of 2 or 3 of above surface codes

TANK BARGE DAMAGE SURVEY DATA FORM - CODING EXPLAINATION/RULES (Continued)

TBDSDF	TBDSDF Q.	Question	Correspon	Corresponding Inspection	
No.	General	Detail	No.	Question	Explaination
\$	Damage center location		1	profile section	respond in CC 17 S(stern), B(Bow) or U(un-known)
9					• question 6 is to be coded only for the type
					of damage coded in CC 11 (
					type of damage) (question 7 is for second
					• when coding fields in tenths of feet use the
					,
					code inches (converted to tenths of feet) in
					foot in the 2 left meet column (if
					code rect in the 3 reit most columns (if 4
					code all 9's if field is unknown
ya Arris					9 's with last digit 8 for all
upproduct					Values the exceed field limit
10 040					profession (4 o 46 lest
					damaged code only longitudinal and trans-
					side code longitudinal
					if knuckle only one of the three (lonzitudi-
					nal, transverse or vertical) are coded; if
					ical and transverse
	1:				<pre>all 3 fields must be coded for rake damage* • Blank fill, right adjust fields*</pre>
					• if a damage location area is answered the
	ilrst damage	Longitudinal	38	longitudinally	• code in CC 18-21 in tenths of Feet the dis-
	ידסכבריסוו	Dia mo TT	ä		rance of damage Irom nearest end
		from bottom	36	vertical	 code in CC 22-24 in tenths of feet the distance of damage from the bottom
nada o se		transverse	1	cross section	• code in CC 25-27 in tenths of feet the distance
		from center			of damage from the center line (separation port
	2/				starbound)
37	first damage	longitudinal	3c	longitudinal	• code in 28-31 in tenths of feet the longitudi-
	-extent			- 1	- 1
and the state of the		vertical	34	vertical extent	 code 32-34 in tenths of feet the vertical ex- rent of demise
4		transverse	3e	transverse extent	• code in 35-37 in tentils of feet the transverse
No.					extent of damage.
					The second secon

TANK BARGE DAMAGE SURVEY DATA FORM - CODING EXPLAINATION/RULES (Continued)

TEDSDF	TBDSDF Question	lestion	Correspor	Corresponding Inspection	
No.	General	Detail	No.	Question	Explaination
		#-12-18-1-18-1-18-1-18-1-18-1-18-1-18-1-			• question 7 is answered only if an answer was coded for secondary type of damage (i.e.,
		- 7	·		 *See general coding explaination -question 6 coding rules for individual section in question 7 are the same as corresponding section in
	second damage	longitudinal from end	38	longitudinally	• code in CC 38-71
		vertical from bottom	3b	vertical	• code in CC 42-44
		transverse from center	1	corss section	• code in CC 45-47
	first damage -extent	longitudinal	3с	longitudinal	• code in CC 48-51
		vertical	34	vertical extent	• code in CC 52-54
		transverse	Зе	transverse extent	• code in CC 55-57
	Double Barrier	side	4	single/double	• in CC 58 code Y(yes) if double sided, N(No) if single side H(Huknown) if unknown
	##****	bettom	5	single/double	• in CC 59 code Y(yes) if double bottomed, N(No) if single bottom H(Hnbrown) if unknown
		end	9	tank contain	• if response to inspection question 6 is "end
			1	profile section	void them code in CC bu r(:es) for double rake or end, N(No) for single rake or end U(Unknown) if cannot tell.
	Tank Penetrated	side	48	penetrate side	• in CC 61 code Y(Yes) if penetrated, N(No) if not penetrated but threatened. H(Hnknown) if
					<u></u>
		bottom	Sa	penetrate bottom	• in CC 62 code Y, N, U, or X (same as for
		end	9	tank contain	• it response to inspection question 6 is pene-
G 1				profile section	trates and void code in CC 63 Y(yes), it can- not tell code U(Unknown).

TANK BARGE DAMAGE SURVEY DATA FORM - CODING EXPLAINATION/RULES (Continued)

BDSDF	TBDSDF Question	estion	Correspond	Corresponding Inspection	
	General	Detail	No.	Question	Explaination
01	Double Barrier Prevent Penetration	side	4p	prevent side penetration	• respond to this only if CC 58 was coded N(No) • in CC 64 respond Y(Yes), N(No but threatened) P(possibly, maybe), U(Unknown), X(No-not
		bottom	ς Σ	prevent bottom penetration	• respond to this only if CC 59 was coded N(No) • in CC 65 respond Y, N, P, U, or X (same as for prevent side repetration)
		end	9	tank contain cargo profile section	• respond to this only if CC 60 was coded N(No) • in CC 66 respond Y, N, P, U, or X (same as
		all ·	4b 5b	prevent side prevent bottom	• respond to this only if CC 58 and 59 were coded N(No) and damage was to a side bottom knuckle area (CC 14-16 were code 5.8)
11	Tank Loaded When Damaged		6(second part)	tank carry cargo when damage	• in CC 67 code Y(Tes), N(No), U(Unknown), X (not applicable)
12	Cause of Damage		2	cause of damage	• in CC 68 code the following letters for in- spection report answers C-Collision R-Rauming, hitting nonsubmerged startonary
				·	Object (locks, docks, etc) G-Grounding H-Nit submcrged objects (rocks, etc.) F-Structural failure (bad welds and/or re-
					A-Cargo Action (shift in tanks causing damage) S-In service, deterioration, wear and tear, tug action, rough service 0-Other miscellaneous causes U-Unknown
No. of the last of					

TANK BARGE DAMAGE SURVEY DATA FORM - CODING EXPLAINATION/RULES (Continued)

TROSOF	TBDSDF Question	stion	Corresponding	Corresponding Inspection	
Ques. No.	General	Detail	No.	Question	Explaination
13	Cost of Repairs		8(first part)	cost of repairs	 respond in tens of dollars (round off to nearest tens) if greater than \$100,000 code 9998 if unknown code 9999 if multiple incidents occur and cost is for total repair code amount in incident 01 and leave all subsequent incident cost blank code answer in CC 70-73 right adjusted, blank filled
71	Weight of repair materials		8(second part)	weight of repair materials	 respond in tens of pounds (round off to nearest tens) if greater than 100,000 pounds code 9998 if unknown code 9999 if multiple incident occur and pounds is for total repair code weight in incident 01 and leave all subsequent incident weights blank code answer in CC 74-77 right justified, blank filled
	Sequence number		N/A	hand written in upper corner	• code in CC 78-80 3 digit sequence number (which range from 100 to 850)

APPENDIX B

TANK BARGE SALTS DATA RECORD LAYOUT

VI			y) wha		_		**		119	481.1	l staji		_	**		-					B	<u>- 1</u>			-																			
	M1d	2	7	7	_	ا	٠,	۹.	_	7	-	-		-	٦,	4 -	٦ ٢			-	~	-	<u>ا</u>	-	7	7	-	-	-	~	-	7	-	22							26	3		
OR ICAN	CRD(COL)	3(27-28)	3(29-30)	3(31)	3(32)	3(33)		3(34)	3(35)	3(36)	3(37)	3(38)	3(39)	3(40)	3(21)	2(41)	3(42)	2(40-04)		3(55)	3(56)	3(57)	3(58)	3(59)	3(60)	3(61-62)	3(63)	3(64)	3(65)	3(66)	3(67)	3(68-69)	3(70)	4(7-31)							(73 66)	4(35-36)		
RECORD	Description	Design Speed	Type Propulsion	Number of Boilers	Type Wheel	Nimbor of Chafte		Stern Bearing/Kort Nozzel	Position/Thruster	Skeg/Flanking	Bridge	E/R Automation	Auto Tenston	Cooting	2008 11108	4	Number of Fumps	Capacity		Units	Highest Grade	Highest Grade	Rake Grade	Deck Tank	Number Tanks Across	Number Tanks Lengthwise	Intergral/Independent	Elevated Pressure	Temperature	Insulated		Number of Holds	Desk Openings	Owner								operator		
SALTS	Position	113-114	115-116	117	118	110	277	071	121	122		124	125	126		177		151-671	132-135	136	137	138	139	140	141	142-143	144	145	146	147		149-150	151	152-155	156-159	160-163	164-167	168-171	172-175	176	177 100	181-186		
FIELD	Wid	2	7	-	_		٠ .	-	_	_	_	-	-		4 -	٠,		~	4	-	1	7	-1		-	7	nul.	1	-	-	-	7	-	7	7	7	7	7	7	-		* <	•	
SALTS	No.	40	41	42	٤7	? * *	; ;	40	97	74	48	67	20	2 2	1 5	77	2, 2	74	55	26	57	28	59	09	61	62	63	79	65	99	67	68	69	70	71	72	73	74	7.5	76	7 0	7,0	2	
-83	Wid	2	9		0	`			32				-			_	;	1 4		-		7	4	3	7		7	2		7	7	9	ო	က	9		_	7	-	1 -	1 -	٦.	•	
OR IGAN	CRD(COL)	1(1-2)	1(3-8)	,	1 (9-17)	`i .\-			1(18-49)								(3. 0)	(CT-Z)Z				2(16-17)	2(18-21)	2(22-24)	2(25-28)	2(29)	2(30)	2(46-50)		2(51-54)	2(55-58)	2(59-61)	2(62-64)	2(65-67)	3(3-8)		3(21)	3(22)	3(23)	2(36)	3(24)	3(25)	(2)	
RECORD	Description	Vessel ID Type	Vessel ID		Sort Pield				Vessel Name									Place Bullt-City/County				Place Built-ST/For	Year Built	Vessel Class (Type)	Class	Subchapter	Barge Hull	Registered Length		Breadth (MLD)	Registered Breadth	Depth (MLD)	Draft Design	Registered Depth	Gross	3	Hull Material	Special Material	Fore Body	Too Channell and	ree or enginemen	Double Sides		
SALTS	Position	1-2	3-4	8-5	9-12	13	3 ;	14-17	18-21	22-25	26-29	30-33	34-37	17-82	75-05	Cb-74	65-49	20-23	54-57	58-61	62-63	94-65	69-99	70-72	73-76	77	78	19	80-83	84-87	88-91	95-94	95-97	98-100	101-102	103-106	107	108	200	31	7110	111	1	
FIELD	Wid	2	7	4	7	-	4	4	4	4	4	7	4	4		4 .	4	3	4	4	7	2	4	m	4	7	-	-	4	4	4	e	m	m	7	7	7	-	-	1 -	٠,	٦ -	1	
ALTS FI	No.		7	m	4)	9	_	œ	0	10	:=	2	7 :	7:	51	7	16	11	18	19	20	21	22	23	77	25	56	27	78	29	30	31	32	33	34	35	36	, ,	200	2 8	3	

			TANK	BARCE DAMAGE		SURVEY	RFCORD	D FORMAT		¥.	
TS FI	FIELD	SALTS	S RECORD	ORIGAN	1	SALTS	FIELD	SALTS	RECORD	ORIGAN	
No.	PIM	Posttion	Description	CRD(COL) W	ME	No.	Wid	Position	Description	CRD(COL)	7,14
79	4	185-188			-	118	1	285	Damage Area-Face	6(13)	-
80	4.	189-192				911		8	a)	6(14-16)	3
7 6	4 4	193-196				120		289	amage Location	6(17)	-
70	+ -	201				122		290-293	1st Longitudinal Location	6(18-21)	4
78	1 4	202-205	Oberator-Street Address	(72-25)	20	123	, m	297 - 299		6(22-24)	
85	4	206-209		— }	2	124		300-303		[created]	7 ×
98	4	210-213				125		304-307		6(28-31)	. 4
87	4	214-217				126		308-310	-	6(32-34)	m
88	4	213-221				127		311-313	1st Transverse Extent	6(35-37)	<u>س</u>
88	4	222-225	Operator City	_ 6	14	128		314-317	Individual Damage Area	[created]	80
8	4	226-229		5(1-10)		129	4 .	318-321			
91	4 (230-233				131	\$ <	326-325	Total Damage Area	[created]	 ∞
76	۷ (256 252				133		320-329			
2 %	7 4	236-237			7	7 ~	5 ~	330-333	Crack Length	CZ	4
2	; -	147-957	Operator Zip	5(13-17)	~	13%	* c	334-337	Longitud	7-87)	7
2 4	4 0	776 676				136	<u>، د</u>	ຊ :		6(42-44)	m
6 6	7 0	245-244		5(18-19)	7	136	n <	341-343		6(45-47)	_
2 00	۷ ۲	077-647		5(20-21)	7	137		37.0 350	Longitud	6(78-51)	<u>-2</u>
2 8	٧ (947-147		5(22-23)	7	130		348-350	Vertical Ex	6(52-54)	
2 5	n (249-251	Certified OCMI	5(24-26)	m	120	n -	351-353	insverse	6(55-57)	m
201	7 (252-253		5(27-28)	7	140		304		6(58)	-
101	4 6	667-467	Inspection Due Month		7	141	1	356	parr ler	6(59)	
103	4 C	162-067	Inspection Due Day	5(31-32)	7	142		357	Tonk bonotrated edge	(09)	٠,
104	40	260-251	Last Dry Dock Month	5(42-43)	7 6	143		358	Penetrated	(19)9	
105	ım	262-264		(64-44)5	٠ ،	144	٦.	359	Penetrated End	6(63)	· -
901	7	265-266		5(56-57)	2	145	-	360	Double Frevent Pen. Side	(64)	-
107	7	267-268	Date Last Update Month	5(72-73)	7	146		361	Double Prevent Pen. Bottom	6(65)	-
103	~	569	Date Last Update (/)	5(74)	Н	147	-	362		(99)9	-4
138	7	270-271		5(75-76)	2	148		363	ent	((2))	7
110	-	272	Update	5(77)	7	149		364	Tank Loaded When damage	6(68)	-
111	7	273-274	Date Last Update Year	5(78-79)	7	051		365	Cause of Damage	(69)9	-4
112	-	27.5	Status	5(80)	-1	151	4	366-369		6(70-73)	4
113	7	276-277	Incident Number	(01-6)9	7	152		370-373		[created]	4
114	7	278-279	Total Number Incident		7	153		374-377		6(74-77)	4
115	~	280-282	Sequence Number	(08-84)9	٣	174	4.	378-381		[created]	4
116	·	283	Type	6(11)	7	155	3	387-385	1st Rearward Locat. Z	[created]	4
	7	587	Damage Type (Second)	6(12)	1	156	4	386-389	lst Longitudinal Locat. %	[created]	4
4 2											1

do cho

34/

APPENDIX C

SALTS ANALYSIS EVENT DEFINITIONS

(3) <

```
SALTS 2.10 SESSION: 11/04/74 09:56:24
  PASSWORD?
                       RDL
/RESIDENT
/+P00L
  POOL FILE NAME? TBP1
THE FOLLOWING FILES ARE CORE RESIDENT
POOL FILE : TRP1
DATA BASE FILE : TKBG
/◆EXIT
/DISPLAY
/◆EVENTS
POOL NAME : TEP1
POOL DATA BASE : TKBG
POOL LEGEND : TANK BARGE POOL
MAXIMUM NUMBER OF EVENTS: 97
POOL UPDATE : 13
*********************
  EVENT NAME?
EVENT NAME : RUP
EVENT LEGEND : HULL-RUPTURED
NUM. FIELDS : 1
FIELD 1 : 155
NUM. CONDS. : 1 INCL
CONDITION 1 : Y, Y.
************
EVENT NAME : NRUP
EVENT LEGEND : HULL-NOT-RUPTURED
NUM. FIELDS : 1
FIELD 1 : 155
NUM. COMDS. : 1 INCL
COMDITION 1 : N. N.
***********
EVENT NAME : PAS
EVENT LEGEND : DAMAG-PLANE-SIDE
NUM. FIELDS : 2
FIELD 1 : 118
NUM. CONDS. : 1 INCL
CONDITION 1 : S.S.
      2 : 119
FIELD
NUM. CONDS. : 2 INCL
CONDITION 1 : RS , RS . CONDITION 2 : SR , SR .
```

EVENT NAME : PAE

```
EVENT LEGEND : DAMAG-PLANE-END
NUM. FIELDS : 2
FIELD 1 : 118
NUM. CONDS. : 1 INCL
CONDITION 1 : E.E.
FIELD 2 : 119
NUM. CONDS. : 2 INCL
CONDITION 1 : PE ,RE .
CONDITION 2 : ER JER .
******************
EVENT NAME : PAR
EVENT LEGEND : DAMAG-PLANE-BOTTOM
NUM. FIELDS : 1
FIELD 1 : 118
NUM. CONDS. : 1 INCL
CONDITION 1 : B,B.
**********************
EVENT NAME : PAD
EVENT LEGEND : DAMAG-PLANE-DECK
NUM. FIELDS : 1
FIELD 1 : 118
NUM. CONDS. : 1 INCL
COMUITION 1 : D.D.
EVENT NAME : KSD
EVENT LEGEND : DAMAG-KNUCKL-SIDDECK
NUM. FIELDS : 1
FIELD
      1 : 119
NUM. CONDS. : 5 INCL
CONDITION 1 : SD .SD .
COMDITION 2 : DS .DS .
CONDITION 3 : RDS, RDS.
CONDITION 4: RSD, RSD.
CONDITION 5 : DSR, DSR.
EVENT NAME : KSB
EVENT LEGEND : DAMAG-KNUCKL-SIDEBOT
NUM. FIELDS :
FIELD 1 : 119
NUM. CONDS. : 2
                2 INCL
CONDITION 1 : SB .SB .
CONDITION 2 : BS .BS .
*****************
```

```
EVENT NAME : KED
EVENT LEGEND : DAMAG-KNUCKL-ENDDECK
NUM. FIELDS : 1
FIELD 1 : 119
NUM. CONDS. : 6 INCL
CONDITION 1 : DE .DE .
COMPITION 2 : ED , ED .
COMDITION 3 : RD .RD .
COMDITION 4: DRE-DRE.
COMDITION 5: RDE-RDE.
CONDITION 6 : FED, FED.
***************************
EVENT NAME : KES
EVENT LEGEND : DAMAG-KNUCKL-ENDSIDE
NUM. FIELDS : 1
FIELD 1 . : 119
            : 6 INCL
NUM. CONDS.
CONDITION 1 : SE .SE .
CONDITION 2 : ES (ES .
CONDITION 3 : RES.RES.
CONDITION 4: RSE, RSE.
CONDITION 5 : SRE, SRE.
CONDITION 6 : SER, SER.
EVENT NAME : KEB
EVENT LEGEND : DAMAG-KNUCKL-ENDBOTT
NUM. FIELDS : 1
              119
FIELD
           :
      1
NUM. CONDS.
            : 8 INCL
COMDITION 1 : BE , BE .
CONDITION 2 : EB .EB .
CONDITION 3 : RB , RB .
CONDITION 4 : BR .BR .
CONDITION 5 : RBE, RBE.
CONDITION 6: REB, REB.
CONDITION 7 : ERB, ERB.
CONDITION 8 : BRE, BRE.
***********
EVENT NAME : UPC
EVENT LEGEND : DAMAG-KNUCKL-UPCORNR
NUM. FIELDS : 1
FIELD
      1
           : 119
NUM. CONDS. : 4 INCL
CONDITION 1 : EDS. EDS.
CONDITION 2 : DSE, DSE.
CONDITION 3 : ESD. ESD.
CONDITION 4 : SED, SED.
```

•••••

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EVENT NAME : LWC

```
EVENT LEGEND : DAMAG-KNUCKL-LWCORNR
NUM. FIELDS : 1
FIELD 1 : 119
NUM. CONDS. : 8 INCL
CONDITION 1 : EBS.EBS.
CONDITION 2 : ESB, ESB.
COMBITION 3: BSE, BSE. CONDITION 4: RSB, RSB. CONDITION 5: BRS, BRS.
CONDITION 6: BSR, BSR.
CONDITION 7 : RBS, RBS.
CONDITION 8 : SRB, SRB.
*****************
EVENT NAME : COM
EVENT LEGEND : DAMAG-COMPOUND
NUM. FIELDS : 1
FIELD 1 : 119
NUM. CONDS. : 4 INCL
COMDITION 1 : DSB.DSB.
CONDITION 2: BSD, BSD.
CONDITION 3: SDB.SDB.
CONDITION 4: SBS.SBS.
***********************
EVENT NAME : DS
EVENT LEGEND : DOUBL-BARRIER-SIDE
NUM. FIELDS : 1
FIELD 1 : 139
NUM. CONDS. : 1 INCL
CONDITION 1: Y,Y.
EVENT NAME : DB
EVENT LEGEND : DOUBL-BARRIER-BOTTOM
NUM. FIELDS : 1
FIELD 1 : 140
NUM. CONDS. : 1 INCL
CONDITION 1 : Y,Y.
EVENT NAME : DE
EVENT LEGEND : DOUBL-BARRIER-END
NUM. FIELDS : 1
FIELD 1 : 141
NUM. CONDS. : 1 INCL
CONDITION 1 : Y,Y.
```

```
EVENT NAME : SS
EVENT LEGEND : SINGL-BARRIER-SIDE
NUM. FIELDS : 1
FIELD 1 : 139
NUM. CONDS. : 1 INCL
CONDITION 1 : N.N.
EVENT NAME : SB
EVENT LEGEND : SINGL-BARRIER-BOTTOM
NUM. FIELDS : 1
FIELD 1 : 140
NUM. CONDS. : 1 INCL
COMDITION 1 : N.M.
***********
EVENT NAME : SE
EVENT LEGEND : SINGL-BAPPIER-END
NUM. FIELDS : 1
FIELD 1 : 141
NUM. CONDS. : 1 INCL
CONDITION 1 : N.N.
***********
EVENT NAME : UE
EVENT LEGEND : UNKNOWN-BARPIER-END
NUM. FIELDS : 1
FIELD 1 : 141
NUM. CONDS. : 1 INCL
CONDITION 1: U,U.
***********
EVENT NAME : SP
EVENT LEGEND : SIDE-PENTRATION
NUM. FIELDS : 1
FIELD 1 : 142
NUM. CONDS. : 1 INCL
CONDITION 1 : Y,Y.
**********
EVENT NAME : BP
EVENT LEGEND : BOTTOM-PENTRATION
NUM. FIELDS : 1
FIELD 1 : 143
NUM. CONDS. : 1 INCL
CONDITION 1 : Y,Y.
```

EVENT NAME : EP

```
EVENT LEGEND : END-PENTRATION
NUM. FIELDS : 1
FIELD 1 : 144
NUM. CONDS. : 1 INCL
CONDITION 1 : Y.Y.
**********
EVENT NAME : EV
EVENT LEGEND : END-VOID-AREA
NUM. FIELDS : 1
FIELD 1 : 142
NUM. CONDS. : 1 EXCL
CONDITION 1 : Y.Y.
*******
EVENT NAME : NSP
EVENT LEGEND : NO-SIDE-PENTRATION
NUM. FIELDS :
FIELD 1 : 142
NUM. CONDS. : 2 INCL
CONDITION 1 : N.N.
CONDITION 2 : X.X.
EVENT NAME : PDS
EVENT LEGEND : DOUBL-SIDE-PREVENT
NUM. FIELDS : 1
FIELD 1 : 145
NUM. CONDS. : 2 INCL
CONDITION 1 : Y,Y.
CONDITION 2 : P.P.
EVENT NAME : PDB
EVENT LEGEND : DOUBL-BOTTOM-PREVENT
NUM. FIELDS : 1
FIELD 1 : 146
NUM. CONDS. : 2 INCL
CONDITION 1 : Y.Y.
CONDITION 2 : P.P.
*****************************
```



```
EVENT NAME : PDE
EVENT LEGEND : NOUBL-END-PREVENT
NUM. FIELDS : 1
FIELD 1 : 147
NUM. CONDS. : 2 INCL
CONDITION 1 : Y.Y.
CONDITION 2 : P.P.
EVENT NAME : PSB
EVENT LEGEND : DOUBL-SIDE/BOTT-PREV
NUM. FIELDS : 1
FIELD 1 : 148
NUM. CONDS. : 2 INCL
CONDITION 1 : Y,Y.
CONDITION 2 : P.P.
***********
EVENT NAME : TP
EVENT LEGEND : TANK-PENETRATION-GEN
NUM. FIELDS : 3
FIELD 1 : 142
NUM. CONDS. : 1 INCL
CONDITION 1 : Y.Y.
FIELD 2 : 143
NUM. CONDS. : 1 INCL
CONDITION 1 : Y.Y.
FIELD 3 : 144
NUM. CONDS. : 1 INCL
CONDITION 1 : Y.Y.
**********
EVENT NAME : LAKE
EVENT LEGEND : RT-LAKES-BAYS-SOUNDS
NUM. FIELDS : 1
FIELD 1 : 106
NUM. CONDS. : 1 INCL
CONDITION 1 : L ,L .
**********************
EVENT NAME : COAS
EVENT LEGEND : RT-COASTWISE
NUM. FIELDS : 1
FIELD 1 : 106
NUM. CONDS. : 1 INCL
CONDITION 1 : C .C .
```

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EVENT NAME : DOEN

```
EVENT LEGEND : PT-DCEANS
NUM. FIELDS :
FIELD 1 : 106
NUM. CONDS. : 1 INCL
CONDITION 1:0\cdot0.
*******
EVENT NAME : RIVR
EVENT LEGEND : RT-RIVERS
NUM. FIELDS :
FIELD 1 : 106
NUM. CONDS. : 1 INCL
CONDITION 1 : R ,R .
EVENT NAME : GLAK
EVENT LEGEND : RT-GREAT-LAKES
NUM. FIELDS : 1
FIELD 1 : 106
NUM. CONDS. : 1 INCL
CONDITION 1: 5 ,5 .
EVENT NAME : CRAK
EVENT LEGEND : DAMAG-CRACK
NUM. FIELDS : 2
FIELD 1 : 116
NUM. CONDS. : 1 INCL
CONDITION 1 : C.C.
FIELD 2 : 117
NUM. CONDS. : 1 INCL
CONDITION 1 : C.C.
*************
EVENT NAME : HOLE
EVENT LEGEND : DAMAG-HOLED
NUM. FIELDS : 2
FIELD 1 : 116
NUM. CONDS. : 1 INCL
CONDITION 1 : H.H.
FIELD 2 : 117
NUM. CONDS. : 1 INCL
CONDITION 1 : H.H.
```

(1)

EVENT NAME : WHOL EVENT LEGEND : DAMAG-WASTED-THROUGH NUM. FIELDS : 1 FIELD 1 : 116 NUM. CONDS. : 1 INCL COMPITION 1: T,T. EVENT NAME : DENT EVENT LEGEND : DAMAG-DENTED.UPSET NUM. FIELDS : 1 FIELD 1 : 116 NUM. CONDS. : 1 INCL CONDITION 1 : D.D. ************************ EVENT NAME : WAST EVENT LEGEND : DAMAG-WASTED NUM. FIELDS : 1 FIELD 1 : 116 NUM. CF.:DS. : 1 INCL CONDITION 1 : W.W. EVENT NAME : R25 EVENT LEGEND : REAR-REACH=LT-25-FT NUM. FIELDS : 1 FIELD 1 : 124 NUM. CONDS. : 1 1 INCL CONDITION 1: 0000,0250. EVENT NAME : R50 EVENT LEGEND : REAR-REACH=25-50-FT NUM. FIELDS : 1 FIELD 1 : 124 NUM. CONDS. : 1 INCL CONDITION 1: 0251,0500. EVENT NAME : R75 EVENT LEGEND : REAR-REACH=50-75-FT NUM. FIELDS : 1 FIELD 1 : 124 NUM. CONDS. : 1 INCL CONDITION 1: 0501,0750.

EVENT NAME : R100 EVENT LEGEND : REAR-REACH=75-100-FT NUM. FIELDS : 1 FIELD 1 : 124 NUM. CONDS. : 1 INCL CONDITION 1: 0751,1000. EVENT NAME : P500 EVENT LEGEND : REAR-PEACH=GT-100-FT NUM. FIELDS : FIELD 1 : 124 NUM. CONDS. : 1 INCL CONDITION 1: 1001,5000. *************** EVENT NAME : BOW EVENT LEGEND : DAMAGE-FROM-BOW NUM. FIELDS : 1 FIELD 1 : 120 NUM. CONDS. : 1 EXCL COMDITION 1: 5.5. *********************** EVENT NAME : STER EVENT LEGEND : DAMAGE-FROM-STERN NUM. FIELDS : 1 FIELD 1 : 120 NUM. CONDS. : 1 INCL CONDITION 1 : S.S. EVENT NAME : C25 EVENT LEGEND : CENTER=LT-25-FT NUM. FIELDS : 1 FIELD 1 : 121 NUM. CONDS. : 1 CONDITION 1 : 0000,0250. ****************** EVENT NAME : C50 EVENT LEGEND : CENTER=25-50-FT NUM. FIELDS : 1 FIELD 1 : 121 NUM. CONDS. : 1 INCL CONDITION # : 0251,0500.

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EVENT NAME : C75 EVENT LEGEND : CENTER=50-75-FT NUM. FIELDS : 1 FIELD 1 : 121 NUM. CONDS. : 1 INCL CONDITION 1: 0501,0750. ****************************** EVENT NAME : C100 EVENT LEGEND : CENTER=75-100-FT HUM. FIELDS : FIELD 1 : 121 NUM. CONDS. : 1 INCL CONDITION 1: 0751,1000. *********** EVENT NAME : C500 EVENT LEGEND : CENTER=GT-100-FT NUM. FIELDS : 1 FIELD 1 : 121 NUM. CONDS. : 1 INCL COMDITION 1 : 1001,5000. ************************* EVENT NAME : PDW1 EVENT LEGEND : DAMAGE-FROM-BOW-ONLY NUM. FIELDS : FIELD 1 : 120 NUM. CONDS. : 1 INCL CONDITION 1 : B.B. ************************ EVENT NAME : UNKR EVENT LEGEND : DAMAGE-UNKNOWN-END NUM. FIELDS : 1 FIELD 1 : 120 NUM. CONDS. : 1 INCL

EVENT NAME : V25

CONDITION 1 : U,U.

EVENT LEGEND : VERT-FROM-BOTT=LT-25

NUM. FIELDS :

FIELD 1 : 122 NUM. CONDS. : 1 INCL CONDITION 1 : 000,025.

EVENT LEGEND : VERT-FROM-BOTT=25-50

EVENT NAME : V50

```
NUM. FIELDS : 1
FIELD 1 : 122
NUM. CONDS. : 1 INCL
CONDITION 1: 026,050.
************************
EVENT NAME : V75
EVENT LEGEND : VERT-FROM-BOTT=50-75
NUM. FIELDS : 1
FIELD 1 : 122
NUM. CONDS. : 1 INCL
CONDITION 1 : 051,075.
EVENT NAME : V100
EVENT LEGEND : VERT-FROM-BOT=75-100
NUM. FIELDS : 1
FIELD 1 : 122
NUM. COMDS. : 1 INCL
COMDITION 1 : 076,100.
EVENT NAME : V500
EVENT LEGEND : VERT-FROM-80T=GT-100
NUM. FIELDS : 1
FIELD 1 : 122
NUM. CONDS. : 1 INCL
CONDITION 1 : 101,500.
EVENT NAME : L100
EVENT LEGEND : IAREA=LT-100-FT
NUM. FIELDS : 1
FIELD 1 : 128
NUM. CONDS. : 1 INCL
COMDITION 1: 0000,0000.
EVENT NAME : ALTI
EVENT LEGEND : IAREA=0-1-FT
NUM. FIELDS : 1
FIELD
     1 : 129
NUM. CONDS. : 1 INCL
CONDITION 1 : 0000,0100.
*********
```

EVENT NAME : ALT2 EVENT LEGEND : IAPEA=1-2-FT NUM. FIELDS : 1 FIELD 1 : 129
NUM. CONDS. : 1 INCL COMDITION 1: 0101,0200. ************************ EVENT NAME : ALT3 EVENT LEGEND : IAREA=2-3-FT NUM. FIELDS : FIELD 1 : 129 NUM. CONDS. : 1 INCL CONDITION 1: 0201,0300. EVENT NAME : ALTS EVENT LEGEND : IAREA=3-5-FT NUM. FIELDS : 1 FIELD 1 : 129 NUM. CONDS. : 1 INCL CONDITION 1: 0301,0500. EVENT NAME : AL10 EVENT LEGEND : IAREA=5-10-FT NUM. FIELDS : 1 FIELD 1 : 129 NUM. CONDS. : 1 INCL CONDITION 1: 0501,1000. EVENT NAME : LLT1 EVENT LEGEND : CRACK-LENG=LT-1-FT NUM. FIELDS : FIELD 1 : 132 NUM. CONDS. : 1 INCL CONDITION 1 : 0000,0010. ************************ EVENT NAME : LLT3 EVENT LEGEND : CRACK-LENG=1-3-FT NUM. FIELDS :

FIELD 1 : 132 NUM. CONDS. : 1 INCL CONDITION 1 : 0011,0030.

EVENT NAME : LLT6 EVENT LEGEND : CRACK-LENG=3-6-FT NUM. FIELDS : 1 FIELD 1 : 132 NUM. CONDS. : 1 INCL CONDITION 1: 0031,0060. ******************* EVENT NAME : LL10 EVENT LEGEND : CPACK-LENG=6-10-FT NUM. FIELDS : 1 FIELD 1 : 132 NUM. CONDS. : 1 INCL CONDITION 1: 0061,0100. ** EVENT NAME : AG10 EVENT LEGEND : IAREA=GT-10-FT NUM. FIELDS : 1 FIELD 1 : 129
NUM. CONDS. : 1 INCL
CONDITION 1 : 1001,9997. EVENT NAME : LG10 EVENT LEGEND : CRACK-LENG-GT-10-FT NUM. FIELDS : 1 FIELD 1 : 132 NUM. CONTS. : 1 INCL CONDITION 1 : 0101,9997. ************** EVENT NAME : RUPT EVENT LEGEND : HULL-RUPTURED NUM. FIELDS : 1 FIELD 1: 157
NUM. CONDS.: 1 INCL
CONDITION 1: Y, Y. ****** EVENT NAME : PUPN EVENT LEGEND : HULL-NOT-RUPTURED NUM. FIELDS : 1 FIELD 1 : 157 NUM. CONDS. : 1 INCL

CONDITION 1 :

N,

EVENT NAME : CDYN EVENT LEGEND : DYNAMIC-CAUS-GZRZCZH NUM. FIELDS: 1 FIELD 1 : 150 NUM. CONDS. : 4 INCL CONDITION 1 : 5,5. COMDITION 2 : R.R. CONDITION 3 : C.C. CONDITION 4: H.H. ******************** EVENT NAME : CSF EVENT LEGEND : STRUCT-FAILURE-CAUSE NUM. FIELDS : 1 FIELD 1 : 150 NUM. CONDS. : 1 INCL CONDITION 1 : F.F. ************ EVENT NAME : CSER EVENT LEGEND : IN-SERVICE-CAUSE NUM. FIELDS : 1 FIELD 1 : 150 NUM. CONDS. : 1 INCL CONDITION 1: S.S. ************************ EVENT NAME : CCA EVENT LEGEND : CARGO-ACTION-CAUSE NUM. FIELDS : 1 FIELD 1 : 150 NUM. CONDS. : 1 INCL CONDITION 1 : A.A. ********************* EVENT NAME : CP10 EVENT LEGEND : CLONG-LENGTH=0-10% NUM. FIELDS : 1 FIELD 1 : 156
NUM. CONDS. : 1 INCL CONDITION 1: 0000,0010. **************** EVENT NAME : CP20 EVENT LEGEND : CLONG-LENGTH=11-20% NUM. FIELDS : 1

FIELD 1 : 156

NUM. CONDS. : 1 INCL
CONDITION 1 : 0011,0020.

(3)

EVENT NAME : CP40 EVENT LEGEND : CLONG-LENGTH=31-40% NUM. FIELDS : 1 FIELD 1 : 156 NUM. CONDS. : 1 INCL CONDITION 1: 0031,0040. EVENT NAME : CP50 EVENT LEGEND : CLONG-LENGTH=41-50% NUM. FIELDS : 1 FIELD 1 : 156 NUM. CONDS. : 1 INCL CONDITION 1: 0041,0050. EVENT NAME : CP60 EVENT LEGEND : CLONG-LENGTH=51-60% NUM. FIELDS : 1 FIELD 1 : 156 NUM. CONDS. : 1 INCL CONDITION 1: 0051,0060. EVENT NAME : CP70 EVENT LEGEND : CLONG-LENGTH=61-70% NUM. FIELDS : 1 FIELD 1 : 156 NUM. CONDS. : 1 INCL CONDITION 1 : 0061,0070. ****** EVENT NAME : CP99 EVENT LEGEND : CLONG-LENGTH=71-100% NUM. FIELDS : FIELD 1 : 156 NUM. CONDS. : 1 INCL CONDITION 1 : 0071,0100. *********************** EVENT NAME : BOTM EVENT LEGEND : VERTICAL EXTENT L.T. NUM. FIELDS : FIELD 1 : 126 NUM. CONDS. : 1 INCL

CONDITION 1 : 000,020.

(3)

EVENT NAME : V20

EVENT LEGEND : VERTICAL C.L. L.T. 2 NUM. FIELDS : 1 FIELD 1 : 122 NUM. CONDS. : 1 INCL COMPITION 1: nan-nen. ********************* EVENT NAME : V10 EVENT LEGEND : VERTICAL C.L. L.T. 1 NUM. FTELDS : 1 FIELD 1 : 122 NUM. CONDS. : 1 INCL COMDITION 1: 000,010. ******************** EVENT NAME : RP10 EVENT LEGEND : PLONG-LENGTH=0-10% NUM. FIELDS : 1 FIELD 1 : 155 NUM. CONDS. : 1 INCL COMBITION 1: 0000,0010. ************************ EVENT NAME : PP20 EVENT LEGEND : RLDNG-LENGTH=11-20% NUM. FIELDS : FIELD 1 : 155 NUM. CONDS. : 1 INCL CONDITION 1: 0011,0020. ********************** EVENT NAME : RP30 EVENT LEGEND : PLONG-LENGTH=21-30% NUM. FIELDS : FIELD 1 : 155 NUM. CONDS. : 1 INCL CONDITION 1: 0021,0030. ********************** EVENT NAME : RP40 EVENT LEGEND : RLONG-LENGTH=31-40% NUM. FIELDS : 1 FIELD 1 : 155 NUM. CONDS. : 1 INCL CONDITION 1 : 0031,0040.

EVENT NAME : RP50

EVENT LEGEND : PLDNG-LENGTH=41-50%

NUM. FIELDS : 1

FIELD 1 : 155 NUM. CONDS. : 1 INCL CONDITION 1: 0041,0050.

EVENT NAME : PP60

EVENT LEGEND : PLONG-LENGTH=51-60%

NUM. FIELDS : 1

FIELD 1 : 155 NUM. CONDS. : 1 INCL CONDITION 1 : 0051.0040

APPENDIX D

SALTS ANALYSIS RESULTS

(5)30+

EXHIBIT D-1. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE DISTANCE FROM BOW--ALL DAMAGE

NO	DE NA	••••• MF?	•••••	ALL	•••••	•••••	•••••	*****	•••••	•••••
			WEIGHT	P	0	-N/D-	51	52	PT	PP
	LEVO		100.00	869	1289		100.00	o.		100.00
	PAS	PAS	7.14	244	244	ŏ	28.08	ō.	28.08	28.08
	PAB	PAB	7.14	179	179	Ű	20.60	0.	20.60	20.60
	PAD	PAD	7.14	30	30	ŏ	3.45	o.	3.45	3.45
	PHE	PAE	7.14	93	93	ŏ	10.70	o.	10.70	10.70
_	KSB	KSB	7, 14	96	96	ŏ	11.05	o.	11.05	11.05
			7.14	59	59	ŏ	6.79	Ŏ.	6.79	6.79
	KES	KSD KES	7.14	46	46	ŏ	5.29	0.	5.29	5.29
		KED	7.14	28	28	ő	3.22	0.	3.22	3.22
	KED	KEB	7.14	42	42	Ö	4.83	0.	4.83	4.83
	KEB		7.14	7	7	Ö	.81	o.	.31	.81
	UPC	UPC LNC	7.14	28	ટક	ŏ	3.22	0.	3.22	3.22
	LWC		7.14	8	3	ŏ	.92	0.	.92	. 92
	7???	COM	7.14	0	0	ŏ	0.	o.	0.	0.
_	2555		7.14	9	ÿ	ŏ	1.04	0.	1.04	1.04
	10A	CP10	10.00	78	78	ŏ	3.98	ŏ.	8.98	31.97
			10.00	44	44	ŏ	5.06	0.	5.06	13.03
17	20A	CP20	10.00	35	35	ŏ	4.03	0.	4.03	14.34
18	30A	CP30 CP40	10.00	27	27	ŏ	3.11	o.	3.11	11.07
	40A	•			26		2.99	o.	2,99	10.66
_	50A	CP50	10.00	26		0	1.50	0.	1.50	5.33
21	60A	CP60	10.00	13	13	0	.35	0.	. 35	1.23
22	70A	CP70 CP99		3	3	ŏ	.33	o.	.23	.82
	99A	しアフフ	10.00	ō	5			o.	0.	n.
	7777		10.00			0.	0.			
	3333		10.00	16	16	0	1.84	0.	1.84	5.56
	1 0B	CP10	10.00	17	17	0	1.96	0.	1.96	9.50
	20B	CP20	10.00	47	47	0	5.41	0.	5.41	26.26
	30B	CP30	10.00	30	30	0	3.45	0.	3.45	16.76
	40B	CP40	10.00	35	35	0	4.03	0.	4.03	19.55
	50B	CPS0	10.00	29	29	0	3.34	0.	3. 34	16.20
	608	CP60	10.00	8	8	0	.92	0.	.92	4.47
	708	CP70	10.00	3	3	0	. 35	0:	, 35	1.68
	99B 7777	CP99	10.00	0	0	0	0.	0.	0.	0.
	5555		10.00	10	10	0	0.	0. 0.	0.	0. 5.59
	10C	CP10	10.00	10	10		1.15	_	1.15	
37	200	CP20	10.00	5	5	0	1.15	0.	.58	33.33 16.67
38	30C	CP30	10.00	6	6	ŏ	.69	0.	.69	20.00
	40C	CP40	10.00	3	3	ŏ	.35	0.	.35	10.00
	50C	CP50	10.00	3	3	ŏ	.35	0. 0.	.35	10.00
	60C	CP60	10.00	0	0	ŏ	0.		0.	0.
	70C	CP70	10.00	ŏ	ŏ	ŏ	0.	0. 0.	o.	o.
	99C	CP99	10.00	ŏ	ŏ	ŏ	0.	ŏ.	o.	o.
	????	OF J.	10.00	ŏ	ŏ	ŏ	o.	0.	0.	0.
	5555		10.00	3	š	ŏ	.35	0.	.35	10.00
	10D	CP10	10.00	41	41	ŏ	4.72	ŏ.	4.72	44.09
	COD	CP20	10.00	7	7	ŏ	.81	ŏ.	.81	7.53
	30D	CP30	10.00	Ö	Ö	ŏ	0.	ō.	0.	0.
	40D	CP40	10.00	ŏ	õ	ō	o.	Ŏ.	ŏ.	ő.
_	50D	CP50	10.00	ŏ	ŏ	ŏ	ŏ.	o.	Ŏ.	Ŏ.
	60D	CP60	10.00	o	ŏ	ŏ	ŭ.	ŏ.	ŏ.	ŏ.
	70D	CP70	10.00	ŏ	ŏ	ŏ	o.	o.	0.	o.
	990	CP99	10.00	ŏ	ŭ	ő	o.	ŏ.	0.	o.
	7777		10.00	ŏ	ŏ	ŏ	ŏ.	0.	o.	o.
	\$555		10.00	45	45	ŏ	5.18	ŏ.	5.18	49.39
	10E	CP10	10.00	12	12	ŏ	1.38	0.	1.39	12.50
	SOE	CP20	10.00	24	24	ő	2.76	ŏ.	2.76	25.00
	30E	CP30	10.00	15	15	ŏ	1.73	ŏ.	1.73	15.63
	40E	CP40	10.00	10	10	ŏ	1.15	o.	1.15	10.42
	SOE	CP30	10.00	23	23	ŏ	2.65	o.	2.65	23.96
		CP60	10.00	4	-4	Ŏ	. 46	0.	.46	4.17

EXHIBIT D-1. (Continued)

				_	12	-	-	-	-	
	70E	CP70	10.00	0	0	0	0.	0.	0.	v.
63	99E	CP99	10.00	0	0	0	0.	0.	0.	0.
64	????		10.00	0	0	0	0.	0.	0.	0.
	2222		10.00	8	8	0	. 92	0.	. 92	8.33
66	1 OF	CF10	10.00	15	15	0	1.73	0.	1.73	25.42
67	20F	CP20	10.00	5	5	0	. 58	0.	.58	8.47
68	30F	CP30	10.00	12	12	0	1.38	0.	1.38	20.34
	4 0F	CP40	10.00	10	10	0	1.15	0.	1.15	16.95
70	50F	CP50	10.00	8	8	0	.92	0.	. 92	13.56
71	60F	CP60	10.00	3	3	0	. 35	0.	. 35	5.03
72	70F	CP70	10.00	1	1	0	.12	0.	.12	1.69
73	9 9F	Cbéá	10.00	0	0	0	U.	Q.	0.	0.
74	7777		10.00	0	0	0	0.	0.	0	0.
75	3555		10.00	5	5	0	. 58	0.	, 58	3.47
	106	CP10	10.00	19	19	0	2.19	0.	2.19	41.30
77	206	CP20	10.00	2	2	0	.23	0.	.23	4.35
78	306	CP30	10.00	1	1	0	.12	0.	.12	2.17
79	406	CP40	10.00	Û	0	0	0.	o.	0.	0.
90	506	CP50	10.00	0	0	0	0.	0.	0.	0.
81	605	CP60	10.00	0	0	0	0.	0.	0.	0.
82	706	CP70	10.00	0	0	0	0.	0.	0.	0.
83	996	CP99	10.00	0	0	0	0.	0.	0.	0.
84	????		10.00	0	0	ø	0.	0.	0.	0. 52.17
85 86	\$\$\$\$ 10H	CD 1 A	10.00	24	24	0	2.76	0.	2.76 .23	7.14
87	10H	CP10 CP20	10.00 10.00	2 U	2	0	.23	0. 0.	0.	0.
88	30H	CP30		Ö	Ů	ŏ	0. 0.	0.	o.	o.
89	40H	CP40	10.00 10.00	Ü	ŏ	Ö	0.	o.	0.	o.
90	50H	CP50	10.00	ŏ	ŏ	Ö	0.	o.	o.	ŏ.
91	60H	CP60	10.00	ŏ	Ö	ŏ	0.	0.	o.	o.
92	70H	CP70	10.00	ŏ	ŏ	ŏ	0.	ŏ.	ŏ.	ŏ.
93	99H	CP99	10.00	ŏ	ŏ	ŏ	o.	ŏ.	ŏ.	0.
94	7777	G1	10.00	ŏ	ŏ	ŏ	0.	o.	o.	0.
95	\$555		10.00	26	26	ŏ	2.99	o.	2.99	92.86
96	101	CP10	10.00	18	18	Ö	2.07	ŏ.	2.07	42.86
97	105	CP20	10.00	8	8	Ö	.92	Ŏ.	.92	19.05
98	301	C** 10	10.00	ž	ž	0	. 23	0.	.23	4.76
99	40I	C! 0	10.00	ō	Ō	0	U.	0.	0.	0.
100	50I	CP50	10.00	1	1	0	.12	0.	. 12	2.38
101	60I	CP60	10.00	0	0	0	0.	0.	0.	0.
102	701	CP70	10.00	0	0	0	0.	0.	0.	0.
103	99I	CP99	10.00	0	0	0	0.	0.	0.	0.
104	7777		10.00	0	0	0	0.	0.	0.	0.
105	\$\$\$\$		10.00	13	13	0	1.50	0.	1.50	30.95
106	10J	CP10	10.00	0	0	0	0.	0.	0.	0.
107	201	CP20	10.00	0	0	0	0.	0.	0.	0.
108	30J	CP30	10.00	0	0	0	0.	0.	0.	0.
109		CP40	10.00	0	0	0	0.	0.	0.	0.
110	201	CP50	10.00	1	1	0	. 12	0.	. 12	14.29
	601	CP60	10.00	0	0	U	0.	0.	0.	0.
112		CP70	10.00	0	0	0	0.	0.	0.	0.
	997	CP99	10.00	1	1	0	. 12	0.	. 12	14.29
114	????		10.00	0	0	0	0.	0.	0.	0. 71.43
113	\$\$\$\$	CD1 C	10.00	5	5	0	.58	0.	.58	
116	1 0K	CP10	10.00	17	17	0	1.96	0.	1.96	60.71
117		CP20	10.00	5	5	0	. 58	0. 0.	, 58	17.86
118	30K	CP30 CP40	10.00 10.00	0	0	0	O. U.	0.	0. 0.	0.
120		CP50	10.00	Š	Š	0	.23	0.	.23	7.14
121		CP60	10.00	Õ	0	Č	0.	0.	0.	0.
122		CP70	10.00	ŏ	ŏ	Ŏ	0.	Ŏ.	0.	ŏ.
123		CP99	10.00	ŏ	ŏ	Ö	o.	o.	o.	o.
	7777	J. V.	10.00	ŏ	ŏ	ŏ	o.	o.	ŏ.	0.
				-	-	-				

EXHIBIT D-1 (Continued)

125	5555		10.00	4	4	0	.46	0.	.46	14.29
126	10L	CP10	10.00	1	1	0	. 12	0.	.12	12.50
127	20L	CP20	10.00	1	1	0	.12	0.	.12	12.50
128	30L	CP30	10.00	0	0	0	0.	0.	0.	0.
129	404	CP40	10.00	0	0	0	0.	0.	v.	6.
130	50L	CP50	10.00	3	3	0	. 35	0.	. 35	37.50
131	6 OL	CP60	10.00	1	1	0	.12	0.	.12	12.50
132	70L	CP70	10.00	1	1	0	.12	0.	.12	12.50
133	996	CPaa	10.00	U	0	U	0.	0.	0.	0.
134	2232		10.00	0	0	0	0.	0.	0.	0.
135	5355		10.00	1	1	0	.12	0.	.12	12.50

EXHIBIT D-2. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE DISTANCE FROM BOW--HULL RUPTURES

•••••	•••••	•••••	•••••	*****	••••••	••••••	• • • • • • •	•••••
NODE NAME?	THE PARKET	ALL	•	N. A			6.7	PP
NO. NAME EVENT	100.00	R 497	869	-N/D-			100.00	100.00
2 PAS PAS	7.14	157	157	0	100.00 31.59	0. 0.	31.59	31.59
3 PAB PAB	7.14	90	90	ŏ	18.11	o.	18.11	18.11
4 PAD PAD	7.14	15	15	ŏ	3.02	0.	3.02	3.02
5 PAE PAE	7.14	57	57	ŏ	11.47	ŏ.	11.47	11.47
6 KSB KS	7.14	48	48	٥	9.66	0.	9.66	9.66
7 KSD KSD	7.14	30	30	Ŭ o	6.04	0.	6.04	6.04
8 KES KES	7.14	23	53	ŏ	4.63	ŏ.	4.63	4.63
9 KED KED	7.14	24	24	ŏ	4.83	ŏ.	4.83	4.83
10 KEB KEB	7.14	21	Ži	ŏ	4.23	ő.	4.23	4.23
11 UPC UPC	7.14	4	4	ō	.80	o.	.80	.80
12 LWC LWC	7.14	17	17	Ŏ	3.42	o.	3.42	3.42
13 COM COM	7.14	6	6	0	1.21	0.	1.21	1.21
14 ????	7.14	Ö	Ō	0	0.	0.	0.	0.
15 \$355	7.14	5	5	0	1.01	0.	1.01	1.01
16 10A CP10	10.00	57	57	0	11.47	0.	11.47	36.31
17 20A CP20	10.00	23	28	0	5.63	0.	5.63	17.83
18 30A CP30	10.00	28	28	0	5.63	0.	5.63	17.83
19 40A CP40	10.00	12	12	0	2.41	0.	2.41	7.64
20 50A CF50	10.00	15	15	0	3.02	0.	3.02	9.55
21 60A CP60	10.00	8	8	0	1.61	0.	1.61	5.10
22 70A CP70	10.00	2	2	U	.40	0.	.40	1.27
23 99A CP99	10.00	1	1	0	.20	0.	.20	. 64
24 ????	10.00	0	0	0	0.	0.	0.	0.
25 \$515	10.00	6	6	0	1.21	0.	1.21	3.82
26 10B CP10	10.00	11	11	0	2.21	0.	2.21	12.22
27 208 CP20	10.00	27	27	0	5.43	0.	5.43	30.00
28 30B CF30	10.00	14	14	0	2.82	0.	2.82	15.55
29 40B CP40	10.00	18	18	0	3.62	0.	3.62	20.00
30 50B CP50	10.00	13	13	0	2.62	0.	2.62	14.44
31 608 CP60	10.00	3	3	0	.60	0.	.60	3.33 0.
32 708 CP70	10.00	0	0	0	0.	0.	0.	0.
33 998 CP99 34 ????	10.00	0	0	0	0.	0.	0.	o.
	10.00		-		0.	0.	0.	
35 \$515	10.00	4	4	0	.80	0.	.80	4.44
36 10C CP10	10.00	5	5	0	1.01	0.	1.01	33.33
37 20C CP20	10.00	2	2	0	.40	0.	.40	13.33
38 30C CP30 39 40C CP40	10.00	1	1	0	.20	0. 0.	.20	6.67
40 50C CP50	10.00	3	3	'0	.60	0.	.60	20.00
41 60C CP60	10.00	ő	Ŏ	ŏ	0.	o.	0.	0.
42 70C CP70	10.00	ŏ	ŏ	ŏ	o.	o.	o.	o.
43 99C CP99	10.00	ő	ŏ	ŏ	o.	ŏ.	ŏ.	o.
44 ????	10.00	ő	ő	ŏ	ō.	o.	o.	o.
45 \$\$\$\$	10.00	š	š	Ŏ	.60	o.	.60	20.00
46 10D CP10	10.00	19	19	ŏ	3.82	o.	3.82	33.33
47 20D CP20	10.00	i	i	ŏ	.20	Ŏ.	.20	1.75
48 30D CP30	10.00	ō	ō	Ŏ	0.	o.	0.	0.
49 40D CP40	10.00	Ŏ	ŏ	ŏ	Ŏ.	Ŏ.	0.	o.
50 50D CP50	10.00	Ŏ	ŏ	Ŏ	0.	0.	0.	0.
51 60D CP60	10.00	0	0	0	0.	0.	0.	0.
52 700 CP70	10.00	0	0	0	0.	0.	0.	0.
53 99D CP99	10.00	Ö	. 0	0	0.	0.	0.	0.
54 2777	10.00	0	0	٥	0.	0.	O.	0.

EXHIBIT D-2. (Continued)

55	\$\$\$\$		10.00	37	37	0	7.44	0.	7.44	64.91
56	1 0E	CP10	10.00	8	8	0	1.61	0.	1.61	16.67
57	20E	CP20	10.00	12	12	0	2.41	0.	2.41	25.00
58	30E	CP30	10.00	11	11	U	2.21	0.	2.21	22.92
59	40E	CP40	10.00	2	2	0	.40	0.	.40	4.17
60	SOE	CP50	10.00	9	9	0	1.81	0.	1.81	18.75
61	60E	CP60	10.00	2	2	Ō	.40	0.	.40	4.17
62	70E	CP70	10.00	ō	Ō	Ö	0.	0.	0.	0.
63	99E	CP99	10.00	ŏ	Ŏ	Ŏ	0.	0.	o.	o.
64	????	• • • •	10.00	ŏ	ŏ	ŏ	0.	o.	o.	Ŏ.
65	\$\$\$\$		10.00	4	ă.	ŏ	.80	ŏ.	.80	8.33
66	1 OF	CP10	10.00	7	7	ŏ	1.41	0.	1.41	23.33
67	20F	CP20	10.00	4	4	ŏ	.80	ŏ.	.80	13.33
68	30F	CP30	10.00	4	4	ŏ	.80	ŏ.	.80	13.33
69	40F	CP40	10.00	7	7	ŏ	1.41	ŏ.	1.41	23.33
70	50F	CP50	10.00	4	4	ŏ	.80	ŏ.	.80	13.33
71	60F	CP60	10.00	ī	ī	ŏ	.20	o.	.20	3.33
72	70F	CP70	10.00	ò	ò	Ö	0.	o.	0.	0.
								_		
73	99F	CP99	10.00	Ŏ	0	0	0.	0.	0.	0.
74	????		10.00	0	0	0	0.	0.	0.	0.
75	\$555		10.00	3	3	0	.60	o.	.60	10.00
76	1 0G	CP10	10.00	6	6	0	1.21	0.	1.21	26.09
77	206	CP20	10.00	0	0	0	0.	o.	0.	0.
78	306	CP30	10.00	0	0	0	0.	0.	0.	0.
79	406	CP40	10.00	0	0	0	U.	0.	0.	0.
80	50G	CP50	10.00	0	0	0	0.	0.	0.	0.
81	606	CP60	10.00	0	0	0	0.	0.	0.	0.
82	705	CP70	10.00	0	0	0	0.	0.	0.	0.
83	996	Cböö	10.00	0	0	0	0.	0.	0.	0.
84	7777		10.00	0	0	0	0.	0.	0.	0.
85	2222		10.00	17	17	0	3.42	0.	3.42	73.91
86	1 OH	CP10	10.00	2	2	0	.40	0.	.40	8.33
87	HOS	CP20	10.00	0	0	0	0.	0.	0.	0.
88	30H	CP30	10.00	0	0	0	0.	0.	0.	0.
89	4 0H	CF40	10.00	0	0	0	0.	0.	0.	0.
90	SOH	CP50	10.00	U	0	0	0.	0.	0.	0.
91	6 OH	CP60	10.00	0	0	0	0.	0.	0.	0.
92	70H	CP70	10.00	0	0	0	0.	0.	0.	0.
93	99H	CP99	10.00	0	0	0	0.	0.	0.	0.
94	7777	• • • •	10.00	0	0	Ó	0.	0.	0.	0.
-	3555		10.00	22	22	0	4.43	0.	4.43	91.67
96	101	CP10	10.00	7	7	0	1.41	0.	1.41	33.33
97	105	CP20	10.00	5	5	Ō	1.01	0.	. 1.01	23.81
98	301	CP30	10.00	Ŏ	Ŏ	0	0.	0.	0.	0.
22	401	CP40	10.00	ŏ	ŏ	Ö	0.	0.	0.	0.
	501	CP50	10.00	* i	ĭ	'0	.20	0.	.20	4.76
01	601	CP60	10.00	Ö	ō	0	0.	0.	0.	0.
	701	CP70	10.00	ŏ	ŏ	0	o.	0.	0.	0.
	991	CP99	10.00	ŏ	ŏ	Ö	0.	0.	0.	0.
04	3333	V1 //	10.00	ŏ	ŏ	Ö	v.	o.	0.	0.
	\$\$\$\$		10.00	š	š	Ö	1.61	o.	1.61	38.10
	105	CP10	10.00	Ö	Ŏ	Ö	0.	Ŏ.	0.	0.
	201	CF20	10.00	ŏ	ŏ	Ö	0.	Ŏ.	ŏ.	ŏ.
03	301	CP30	10.00	Ö	ŏ	Ö	Ű.	o.	ŏ.	o.
		CP40	10.00	Ö	Ö	0	0.	Ŏ.	0.	ŏ.
	40J				Ö	Ö	0.	o.	Ŏ.	o.
	50J	CP50	10.00	Û	ŏ	Ö	0.	o.	0.	ŏ.
	60J	CP60	10.00	0	ŏ		0.	o.	o.	0.
12	70J	CP70	10.00	0		0			o.	ŏ.
	99J	CP99	10.00	0	0	0	0.	0.	0.	o.
14	7777		10.00	0	0	0	0.	0.	v.	٠.



EXHIBIT D-2 (Continued)

115 \$\$\$\$		10.00	4	4	0	.80	0.	.80	100.00
116 10K	CP10	10.00	9	9	0	1.81	0.	1.81	52.94
117 20K	CP20	10.00	4	4	0	.80	0.	.80	23.53
118 30K	CP30	10.00	Û	0	0	0.	0.	0.	0.
119 40K	CF40	10.00	0	0	0	0.	0.	0.	0.
120 50K	CF50	10.00	0	0	0	0.	0.	0.	0.
121 60K	CP60	10.00	0	0	0	0.	0.	0.	0.
122 79K	CP70	10.00	Ô	0	0	0.	0.	0.	0.
123 99K	CP99	10.00	0	0	0	0.	0.	0.	0.
124 ????		10.00	Ò	Ô	0	0.	0.	0.	0.
125 \$\$\$\$		10.00	4	4	0	.80	0.	.80	23.53
126 10L	CP10	10.00	1	1	0	.20	0.	.20	16.67
127 20L	CP20	10.00	1	1	0	.20	0.	.20	16.67
128 30L	CP30	10.00	Ŏ	Ō	Ŏ	0.	0.	0.	0.
129 40L	CF 40	10.00	Ŏ	Ŏ	Ö	0.	0.	0.	0.
130 50L	CP50	10.00	2	2	0	.40	0.	.40	33.33
131 60L	CP60	10.00	1	ī	Ŏ	.20	O.	.20	16.67
132 70L	CP70	10.00	1	i	0	.20	o.	.20	16.67
133 99L	CP99	10.00	ŏ	Õ	Ŏ	0.	0.	0.	0.
134 ????		10.00	ó	٥	Ŏ	0.	O.	0.	0.
135 \$\$\$\$		10.00	ň	ñ	ŏ	o.	Ŏ.	0.	0.
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EXHIBIT D-3. LOGIC DIAGRAM FOR ANALYZING DAMAGE CENTERLINE DISTANCE FROM BOW--CRACKS

**********	•••••	•••••	•••••	****	•••••	*****	• • • • • •	•••••
NOTIC NAME?		ABL.						
HD. NAME EVENT	MEIGHT			-	51		PT	
1 LEVO BOWL	100.00	280	436	0	100.00	0.		100.00
2 PAS PAS	7.14	101	101	0	36.07	0.	36.07	36.07
3 PAK PAK	7.14	41	41	0	14.64	0.	14.64	14.64
4 PAD PAD	7.14	8	8	0	2.86	0.	2.86	2.86
5 PAE PAE	7.14	31	31	0	11.07	0.	11.07 8.93	11.07 8.93
6 KSB FSB 7 KSD FSD	7.14 7.14	25 34	25 24	0	8.93 8.57	0.	8.57	8.57
8 KEZ FEZ	7.14	24 13	13	0	4.64	0. 0.	4.64	4.64
9 KED KED	7.14	14	14	ő	5.00	ő.	5.00	5.00
10 KEB KEB	7.14	7	7	ŏ	2.50	ő.	2.50	2.50
11 UPC UPC	7.14	3	3	ŏ	1.07	o.	1.07	1.07
12 LWC LWC	7.14	6	6	Ó	2.14	0.	2.14	2.14
13 CDM CDM	7.14	4	4	0	1.43	0.	1.43	1.43
14 3333	7.14	Q	0	0	0.	0.	0.	0.
15 \$15\$	7.14	3	3	0	1.07	0.	1.07	1.07
16 10A CP10	10.00	35	35	0	12.50	0.	12.50	34.65
17 20A CP20	10.00	20	20	0	7.14	0.	7.14	19.80
18 30A CP30	10.00	15	15	0	5.36	0.	5.36	14.85
19 40A CP40	10.00	8	8	0	2.86	0.	2.86	7.92
20 50A CP50	10.00	9	9	0	3.21	0.	3.21	8.91
21 60A CP60 22 70A CP70	10.00	7	1	0	2.50 .36	0. 0.	2.50 .36	6.93 .99
23 99A CP99	10.00	i	i	Ö	. 36	0.	.36	.99
24 ????	10.00	ò	ò	ŏ	0.	ŏ.	0.	0.
25 \$\$\$\$	10.00	5	Š	ŏ	1.79	ŏ.	1.79	4.95
26 10R CP10	10.00	4	4	ŏ	1.43	o.	1.43	9.76
27 20B CP20	10.00	13	13	ò	4.64	0.	4.64	31.71
28 30B CP30	10.00	8	8	0	2.86	0.	2.86	19.51
29 40B CP40	10.00	6	6	0	2.14	0.	2.14	14.63
30 50B CP50	10.00	8	8	0	2.86	0.	2.86	19.51
31 60B CP60	10.00	1	1	0	. 36	0.	. 36	2.44
32 70B CP70	10.00	0	0	0	0.	0.	0.	0.
33 998 CP99	10.00	0	0	0	0.	0.	0.	0.
34 ????	10.00	0	0	0	0.	0.	0.	0.
35 \$\$\$\$ 36 100 CP10	10.00 10.00	1 2	1 2	0	.36	0.	.36	2.44 25.00
37 200 CP20	10.00	1	1	0	.36	0. 0.	.36	12.50
38 30C CP30	10.00	i	i	ŭ	.36	o.	.36	12.50
39 40C CP40	10.00	ò	ò	ŏ	0.	ŏ.	0.	0.
40 50C CP50	10.00	ž	2	ō	.71	o.	.71	25.00
41 60C CP60	10.00	Ō	0	Ö	0.	o.	0.	0.
42 700 CP70	10.00	0	0	0	0.	0.	0.	0.
43 99C CP99	10.00	0	0	0	0.	0.	0.	0.
44 7777	10.00	0	0	Ű	u.	0.	0.	0.
45 \$888	10.00	5	2	0	.71	0.	.71	25.00
46 10D CP10	10.00	5	5	0	1.79	0.	1.79	16.13
47 20D CP20	10.00	1	1	0	, 36	0.	, 36	3.23
48 30D CP30	10.00	0	0	0	0.	0.	0.	0.
49 40D CP40 50 50D CP50	10.00	0	0	0	0. 0.	0.	0. 0.	0. 0.
51 60D CP60	10.00	ŏ	ŏ	ŏ	o.	0. 0.	0.	0.
52 70D CP70	10.00	ŏ	ŏ	ŏ	o.	Õ.	ŏ.	o.
53 99D CP99	10.00	ŏ	ŏ	ŏ	ŏ.	õ.	ŏ.	ŏ.
54 ????	10.00	ŏ	ŏ	ŏ	o.	ŏ.	ŏ.	0.
55 \$\$\$\$	10.00	25	25	0	8.93	Ŏ.	8.93	80.65
56 10E CP10	10.00	3	3	0	1.07	0.	1.07	12.00
57 20E CP20	10.00	7	7	0	2.50	0.	2.50	28.00
58 30E CP30	10.00	7	7	0	2.50	0.	2.50	28.00
59 40E CP40	10.00	1	1	0	. 36	0.	. 36	4.00
60 50E CP50	10.00	5	5	0	1.79	0.	1.79	20.00
61 60E CP60	10.00	1	1	Ó	. 36	0.	, 36	4.00
62 70E CP70	10.00	0	0	0	0.	0.	0.	0.
63 99E CP99 64 7777	10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
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\$\frac{6}{6}\$ \text{OP}\$ \text{CP10}\$ \text{10}, \text{00}\$ \text{5}\$ \text{0}\$ \text{1}, \text{279}\$ \text{0}\$ \text{1}, \text{4}\$ \text{2}\$ \text{5}\$ \text{0}\$ \text{0}\$					EX	нівіт і)-3.	(Cont	inued)		
67 20F CP30	65			10.00	1	1	0	. 36	0.	. 36	4.00
68 30F (P30 10.00 3 3 7 1.07 0. 1.07 12.7 12.6 9 40F (P40 10.00 6 6 0 2.14 0. 2.14 25.7 12.7 1 60F (P50 10.00 1 0.00 3 3 3 0 1.07 0. 1.07 12.7 1 60F (P50 10.00 1 0 0 0 0 0. 36 0. 3							0				20.83
69 40F (P40) 10.00 6 6 2.14 0. 2.14 2. 70 50F (P50) 10.00 3 3 0 1.07 12. 2. 1.07 12. 2. 1.07 12. 1.07 1.07 1.07 12. 1.07 0. 1.07 12. 1.07 0.								•			
70 50F CP50 10.00 3 3 0 1.07 0. 1.07 12. 1.0F CP60 10.00 1 1 0 .36 0. .36 0. .36 0. .72 70F CP70 10.00 0 0 0 0 0 0 0 0 0							_				25.00
71 60F CP60							-			1.07	12.50
73 99F (P99 10.00 0 0 0 0 0 0 0 0 0 0 0 0 0 7 7 7 7 7	_				1		-				4.17
74 2777					-						
75 \$141\$			CERR				-				
76 105 CP10							-				8.33
78 306 CP30 10.00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					3	3	0	1.07			23.08
79 406											
80 5.06					-						_
82 706 CP70 10.00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0							-				
83 996 CP99 10.00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					0	-					
84 7777					-						
85 \$\$\$\$\$ 10.00			Cháà		-		-			_	
86 10H CP10 10.00 0 0 0 0. 0. 0. 0. 0. 87 20H CP20 10.00 0 0 0 0 0. 0. 0. 0. 0. 0. 0. 88 30H CP30 10.00 0 0 0 0 0 0. 0. 0. 0. 0. 0. 0. 89 40H CP40 10.00 0 0 0 0 0 0. 0. 0. 0. 0. 0. 99 50H CP50 10.00 0 0 0 0 0. 0. 0. 0. 0. 0. 0. 91 60H CP60 10.00 0 0 0 0 0. 0. 0. 0. 0. 0. 92 70H CP70 10.00 0 0 0 0 0 0. 0. 0. 0. 0. 0. 93 99H CP99 10.00 0 0 0 0 0. 0. 0. 0. 0. 0. 94 7??? 10.00 0 0 0 0 0 0. 0. 0. 0. 0. 0. 94 7??? 10.00 0 0 0 0 0 0. 0. 0. 0. 0. 0. 95 \$					-		-				76.92
88 30H		1 0H									0.
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94 ????? 10.00 0 0 0 0 0 0		70H								0.	0.
95 \$\$\$\$ 10,00			CP99								
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99 401 CP40 10.00 0 0 0 0. 0. 0. 0. 0. 0. 0. 00 00 00											28.57
00 501					_						
01 601 CP60											
102 701 CP70					_						
04											
05 15 10 10 0 3 3 0 1 07 0 0 0 0 0 0 0 0	03		CP99	10.00	0	0	0	0.	0.	0.	
106 10J CP10 10.00 0 0 0 0 0 0 0 0 0					-		-				
07 20J CP20 10.00 0 0 0 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.			CP10				-		_		42.86
109 40							-		_	_	_
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20 50k CP50 10.00 0 0 0 0. 0. 0. 0. 21 60V CP60 10.00 0 0 0 0 0 0. 0. 0. 0. 22 70k CP70 10.00 0 0 0 0 0 0. 0. 0. 0. 23 99K CP99 10.00 0 0 0 0 0. 0. 0. 0. 0. 24 7777 10.00 0 0 0 0 0. 0. 0. 0. 0. 25 \$\$1\$\$\$\$\$\$\$\$\$\$10.00 2 2 0 .71 071 33. 26 10L CP10 10.00 1 1 0 .36 036 25. 27 20L CP20 10.00 1 1 0 .36 036 25. 28 30L CP30 10.00 0 0 0 0. 0. 0. 0. 29 40L CP40 10.00 0 0 0 0 0. 0. 0. 0. 30 50L CP50 10.00 0 0 0 0. 0. 0. 0. 31 60L CP50 10.00 1 1 0 .36 036 25.	18					0	0				
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24 ????							ŏ				_
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28 30L CP30 10.00 0 0 0 0. 0. 0. 0. 29 40L CP40 10.00 0 0 0 0. 0. 0. 0. 30 50L CP50 10.00 0 0 0 0. 0. 0. 0. 31 60L CP60 10.00 1 1 0 .36 036 25.											25.00 25.00
29 40L CP40 10.00 0 0 0 0. 0. 0. 0. 30 50L CP50 10.00 0 0 0 0. 0. 0. 0. 31 60L CP60 10.00 1 1 0 .36 036 25.										_	
30 50L CP50 10.00 0 0 0 0. 0. 0. 0. 31 60L CP60 10.00 1 1 0 .36 036 25.	29	4 0L	CP40	10.00	0	0	0		0.		0.
					-		0				
	31	60L 70L	CP60 CP70		1						25.00
33 99L CP99 10.00 0 0 0 0. 0. 0. 0.				10.00		1	0	. 36	0. 0.	.36	25.00
34 7777 10.00 0 0 0 0. 0. 0. 0.			J. 77								
35 \$\$\$\$ 10.00 0 0 0 0. 0. 0.											

(4)

EXHIBIT D-4. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE FROM BOW--HOLES

•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
NODE HAME?		ALL						
NO. HHME EVENT			-	-11/0-	51			PP
1 LEVO ROW1	100.00	244	347	0	100.00	0.		100.00
2 PAS PAS	7.14	62	68	0	25.41	0.	25.41	25.41
3 PAR PAR	7.14	51	51	0	20.90	0.	20.90	20.90
4 PAU PAU	7.14	8	દ	0	3.28	0.	3.28	3.28
. 5 PAE PAE	7.14	30	3.0	0	12.30	0.	12.30	12.30
6 KSB KSB	7.14	24	29	0	11.39	0.	11.89	11.89
7 KSD KSD	7.14	7	7	U	2.87	0.	2.87	2.87
8 KES KES	7.14	11	11	0	4.51	0.	4.51	4.51
9 KED KED	7.14	12	12	Û	4.92	0.	4.92	4.92
10 KEB KEB	7.14	18	18	0	7.38	0.	7.38	7.38
11 UPC UPC	7.14	1	1	0	.41	0.	.41	. 41
12 LWC LWC	7.14	10	1.0	0	4.10	0.	4.10	4.10
13 COM COM	7.14	3	3	0	1.23	0.	1.23	1.23
14 ????	7.14	0	0	0	0.	0.	0.	0.
15 \$ 1 4 5	7.14	2	2	0	. 82	0.	.82	.82
16 10A CP10	10.00	24	24	0	9.84	0.	9.84	38.71
17 20A CP20	10.00	8	8	0	3.28	0.	3.28	12.90
18 30A CF30	10.00	13	13	0	5.33	0.	5.33	20.97
19 40A CP40	10.00	6	6	0	2.46	0.	2.46	9.68
20 50A CP50	10.00	4	4	0	1.64	9.	1.64	6.45
21 60A CP60	10.00	3	3	0	1.23	0.	1.23	4.84
22 70A CP70	10.00	ē	2	Ō	.82	O.	.82	3.23
23 99A CP99	10.00	ō	0	Ŏ	0.	o.	0.	0.
24 7777	10.00	ŏ	Ö	Ŏ	o.	0.	o.	0.
25 1111	10.00	5	ž	Ŏ	.82	o.	.82	3.23
26 10E CP10	10.00	7	7	Ŏ		0.	2.87	13.73
27 20B CP20	10.00	15	15	Ö	6.15	O.	6.15	29.41
28 30E CP30	10.00	6	6	0	2.46	0.	2.46	11.76
29 40B CP40	10.00	14	14	0	5.74	Ô.	5.74	27.45
30 50E CP50	10.00	4	4	Ü	1.64	o.	1.64	7.84
31 60k CP60	10.00	è	ż	ŏ	.82	Ŏ.	.82	3.92
32 70B CP70	10.00	ō	ō	ŏ	0.	Ŏ.	0.	0.
33 99B CP99	10.00	Ö	Ŏ	Ŏ	0.	Ŏ.	ò.	o.
34 ????	10.00	ō	Ŏ	Ŏ	Ŏ.	Ŏ.	Ŏ.	o.
35 \$55\$	10.00	3	3	ŏ	1.23	o.	1.23	5.88
36 10C CP10	10.00	3	3	Ŏ	1.23	o.	1.23	37.50
37 200 CP20	10.00	5	ž	ŏ	.82	o.	.82	25.00
38 30C CP30	10.00	ō	ō	ŏ	0.	0.	0.	0.
39 40C CP40	10.00	ĭ	ĭ	ŏ	. 41	o.	.41	12.50
40 50C CP50	10.00	i	i	ŏ	.41	0.	.41	12.50
41 60C CP60	10.00	ō	ō	ŏ	0.	o.	0.	0.
42 70C CP70	10.00	ŏ	ŏ	ŏ	o.	ō.	ŏ.	ŏ.
43 99C CP99	10.00	ŏ	ŏ	ŏ	ő.	ŏ.	0.	Ŏ.
44 ????	10.00	ŏ	ŏ	ŏ	ŏ.	o.	ŏ.	Ŏ.
45 \$555	10.00	ĭ	ĭ	ŏ	.41	ŏ.	.41	12.50
46 10D CP10	10.00	14	14	ŏ	5.74	Ŏ.	5.74	46.67
47 20D CP20	10.00	Ó	Ö	ŏ	0.	o.	0.	0.
48 30D CP30	10.00	ŏ	ŏ	ŏ	ů.	o.	Ŏ.	o.
49 40D CP40	10.00	ŏ	ŏ	ŏ	ŏ.	o.	o.	Ŏ.
50 50D CP50	10.00	ŏ	ŏ	ŏ	o.	Ŏ.	Õ.	ŏ.
51 60D CP60	10.00	ŏ	ŏ	ŏ	Ŏ.	ŏ.	o.	Ŏ.
52 700 CP70	10.00	ŏ	ŏ	ŏ	o.	ŏ.	Ŏ.	o.
53 99D CP99	10.00	ŏ	ŏ	ŏ	ŏ.	ŏ.	ŏ.	ŏ.
54 ????	10.00	ŏ	ŏ	ŏ	0.	0.	ŏ.	Ŏ.
55 \$\$\$\$	10.00	16	16	ŏ	6.56	0.	6.56	53.33
56 10E CP10	10.00	5	15	_	2.05	0.	2.05	17.24
			6	0	2.46	0.		20.69
57 20E CP20	10.00	6	0	Ú		_	2.46 2.46	20.69
58 30E CP30 59 40E CP40	10.00	6	6	0	2.46	0.	.41	
			1 6		. 41	0. 0.		3.45
60 50E CP50 61 60E CP60	10.00	6	5	0	2.46 .82	4	2.46	20.69
		2	0	Ű		0.	.82	6.90
62 70E CP70 63 99E CP99	10.00	ŏ	Ö	0	0.	0. 0.	0. 0.	0. 0.
64 7777	10.00	ŏ	ŏ	ŏ	0. 0.	o.	0.	0.
		•	v		~•	~ ,	~.	~•

EXHIBIT D-4. (Continued)

18			40.00	•	•				. 22	10 24
65			10.00	3	3	0	1.23	0.	1.83	10.34
66	1 0F	CF10	10.00	2	2	0	.82	0.	. 82	28.57
67	20F	CF20	10.00	1	1	0	. 41	0.	.41	14.29
68	30F	CF 30	10.00	ž	ž	0	. 82	0.	.82	28.57
									_	
69	4 0F	CP40	10.00	0	0	0	υ	0.	0.	0.
70	5 0F	CF 50	10.00	1	1	0	.41	0.	.41	14.29
71	60F	CP60	10.00	0	0	0	0.	0.	0.	0.
72	70F	CP70	10.00	Ò	0	Ô	0.	0.	0.	0.
73	99t.	Cháá	10.00	0	0	0	0.	0.	0.	0.
74	3335		10.00	0	0	0	0.	0.	0.	0.
75	1111		10.00	1	1	0	. 41	0.	.41	14.29
76	1.06	CP10	10.00	3	3	Ö	1.23	0.	1.23	27.27
						_				
77	206	0590	10.00	0	0	0	0.	0.	0.	0.
78	3.06	CF 30	10.00	0	0	0	0.	0.	0.	0.
79	4.05	CP40	10.00	Û	0	0	0.	0.	0.	0.
80	5.06	CP50	10.00	0	0	0	0.	0.	0.	0.
					-					_
81	6.06	CP60	10.00	0	0	0	v.	0.	0.	0.
92	706	CP70	10.00	0	0	0	0.	0.	0.	0.
83	996	CP99	10.00	0	0	0	0.	0.	0.	0.
84	3777		10.00	Ó	Ö	Ŏ	o.	0.	0.	0.
-										
85	2423		10.00	8	8	0	3.28	0.	3.28	72.73
86	1 0H	CP10	10.00	2	2	0	. 82	0.	.82	16.67
87	2 0H	CP20	10.00	0	0	0	0.	0.	0.	Ú.
88	30H	CP30	10.00	Ō	ō	Ö	0.	0.	0.	0.
				-						
89	4 0H	CP40	10.00	0	0	0	0.	0.	0.	0.
90	50H	CP50	10.00	Û	0	0	0.	0.	0.	0.
91	60H	CP60	10.00	0	0	0	0.	0.	0.	0.
92	7 0H	CP70	10.00	Ŏ	Ŏ	Ŏ	Ŏ.	o.	o.	Ů.
								_		
93	99H	CP99	10.00	0	0	0	0.	0.	0.	0.
94	3333		10.00	0	0	0	0.	0.	0.	0.
95	1111		10.00	10	10	0 ·	4.10	0.	4.10	83.33
96	101	CP10	10.00	6	6	ŏ	2.46	0.	2.46	33.33
97	501	CF20	10.00	4	4	0	1.64	v.	1.64	22.22
98	301	CP30	10.00	0	0	0	0.	0.	0.	0.
99	40I	CP40	10.00	0	0	0	0.	0.	0.	0.
100	501	CP50	10.00	ò	Ŏ	Ŏ	0.	0.	o.	0.
				-	-					
101	601	CP60	10.00	0	0	0	0.	0.	0.	0.
102	701	CP70	10.00	0	0	0	v.	0.	0.	0.
103	991	CP99	10.00	0	0	0	0.	0.	0.	0.
104	7777	0, ,	10.09	Ŏ	Ŏ	ŏ	Õ.	ō.	o.	o.
				-				_		
105	2111		10.00	8	8	0	3.28	0.	3.28	44.44
106	10J	CP10	10.00	0	0	0	0.	0.	0.	0.
107	203	CP20	10.00	0	0	0	0.	0.	0.	0.
108	30J	CP30	10.00	Ŏ	ò	Ŏ	o.	o.	Ö.	o.
										_
109	40J	CP40	10.00	0	0	0	0.	0.	0.	0.
110	50J	CP50	10.00	0	0	0	0.	0.	0.	0.
111	60J	CP60	10.00	0	0	0	0.	0.	٥.	0.
	707	CP70	10.00	Ò	Ò	Ò	0.	0.	Ö.	Ů.
							_			
113	991	CP99	10.00	0	0	0	0.	0.	0.	0.
114	7777		10.00	0	0	0	0.	0.	0.	0.
115	2355		10.00	1	1	0	.41	0.	.41	100.00
	1 0K	CP10	10.00	6	6	0	2.46	0.	2.46	60.00
117	SOK	CP20	10.00	2	2	0	.82	0.	.82	20.00
118	30k	CP30	10.00	0	0	0	0.	0.	0.	0.
119	4 0K	CP40	10.00	0	0	0	0.	0.	0.	0.
	50K	CP50	10.00	Ô	Ó	Ò	o.	0.	0.	O.
121	60K		10.00	ŏ	ŏ		_	_		
		CP60				0	0.	0.	0.	0.
122	70K	CP70	10.00	0	Ģ	0	0.	0.	Q.	0.
123	99k	CP99	10.00	0	0	0	0.	0.	0.	0.
124	7777		10.00	0	0	0	0.	0.	0.	0.
	\$555		10.00	ž	ž	ŏ	.82	0.	.82	20.00
		0044								
	1 OL	CP10	10.00	0	0	0	u.	0.	0.	0.
127	20L	CP26	10.00	1	1	0	. 41	0.	.41	33.33
128	30L	CP30	10.00	0	0	0	0.	0.	0.	0.
	40L	CP40	10.00	ŏ	ŏ	ŏ	o.	o.	0.	ŏ.
								_		
	50L	CP50	10.00	1	1	0	.41	0.	.41	33.33
131	€ OL	CP60	10.00	0	0	0	0.	0.	0.	0.
132		COTA	4 4 4 4	4		^	4.4	•	.41	22 22
	70L	CP70	10.00	1	1	U	. 41	v.		33.33
					1	0	.41	0.		33.33
133	70L 99L ????	Chéé	10.00	0	0	0	0.	0. 0.	0.	0. 0.



EXHIBIT D-5. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE DISTANCE FROM STERN--ALL DAMAGE

***	• • • • •	*****	• • • • • • •	*****	• • • • • •	•••••	• • • • • • •	• • • • • •	•••••	•••••
	DE HAI			ALL	_					
	HAME		WEIGHT	R	C	-11/0-	21	25		FF
-	LEV0		100.00	362	1289	0	100.00	ο.		100.00
	PAS	FAS	7.14	94	94	0	25.97	0.	25.97	25.97
	PAL	PAE	7.14	67	67	0	18.51	0.	18.51	18.51
. 4	PAD	PAD	7.14	17	17	0	4.70	0.	4.70	4.70
5	PAE	FHE	7.14	41	41	0	11.33	0.	11.33	11.33
6	KSB	KSB	7.14	45	45	0	12.43	0.	12,43	12.43
	KSD	KSD	7.14	21	21	Ö	5.80	o.	5.80	5.80
	KES	KES	7.14	32	35	Ö	8.84	Ů.	8.84	8.84
	KED	KED	7.14	11	11	ŏ	3.04	ŏ.	3.04	3.04
	KEB	KEB	7.14	7	7	ő	1.93	ŏ.	1.93	1.93
	UPC	UPC	7.14		11	0			3.04	3.04
				11		-	3.04	0.		
	LWC	LUC	7.14	9	9	0	2.49	0.	2.49	2.49
	COM	COM	7.14	4	4	0	1.10	0.	1.10	1.10
	3333		7.14	0	0	0	0.	0.	0.	0.
	2224		7.14	3	3	0	.83	0.	.83	.83
	1 0A	CP10	10.00	35	32	0	8.84	0.	8.84	34.04
17	20A	CP20	10.00	53	55	0	6.08	0.	6.08	23.40
18	30A	CP30	10.00	14	14	0	3.87	0.	3.87	14.89
19	4 0R	CP40	10.00	8	8	0	2.21	0.	2.21	8.51
20	50A	CP50	10.00	4	4	0	1.10	0.	1.10	4.26
	60A	CP60	10.00	3	3	Ö	.83	0.	.83	3.19
	70A	CP70	10.00	1	ĭ	ŏ	.28	ŏ.	.28	1.06
	99A	CP99	10.00	Ô	Ô	ŏ	0.	ŏ.	0.	0.
	7777	OF SE	10.00	ŏ	Õ	ŏ	0.	o.	o.	
										0.
	\$111	0040	10.00	10	10	0	2.76	0.	2.76	10.64
	1 0 F	CP10	10.00	12	12	0	3.31	0.	3.31	17.91
	208	CP20	10.00	15	15	0	4.14	0.	4.14	22.39
	30F	CP30	10.00	15	12	0	3.31	0.	3.31	17.91
	40B	CP40	10.00	14	14	0	3.87	0.	3.87	20.90
	50B	CP50	10.00	7	7	0	1.93	0.	1.93	10.45
	60F	CP60	10.00	0	0	0	0.	0.	0.	0.
	708	CP70	10.00	1	1	0	.28	0.	. 28	1.49
33	991:	CP99	10.00	3	3	0	.83	0. /	.83	4.48
34	7777		10.00	0	0	. 0	0.	0.	0.	0.
35	1111		10.00	3	3	0	.83	0.	.83	4.48
36	1 0C	CP10	10.00	5	5	0	1.38	0.	1.38	29.41
37	200	CP20	10.00	5	5	Ö	1.38	0.	1.38	29.41
38	30C	CP30	10.00	4	4	Ò	1.10	0.	1.10	23.53
39	40C	CP40	10.00	1	i	Ō	.28	0.	. 28	5.88
	500	CP50	10.00	ō	ō	Ŏ	o.	o.	v.	0.
		CP60	10.00	ŏ	ŏ	ŏ	o.	0.	ŏ.	ů.
	60C		10.00	ŏ	Ŏ	Ŏ	0.	0.	o.	v.
	70C	CP70	10.00	ŏ	ŏ	ŏ	ů.	o.	ů.	
	990	CP99		ŏ	ŏ	ŏ	õ.	0.	Ŏ.	0.
	????		10.00	•	ž	ő	.55	ŏ.	. 55	0. 11.76
	2112		10.00	5		_	2.21	Õ.	2.21	11.15
	1 0D	CP10	10.00	8	8	0	0.	Ŏ.	0.	19.51
	200	CP20	10.00	0	0	0		_	o.	0.
	30D	CP30	10.00	0	0	0	0.	0.	_	Ù.
	400	CF40	10.00	0	0	0	0.	0.	0.	0.
50	500	CP50	10.00	0	0	0	0.	0.	0.	0.
	60D	CP60	10.00	0	0	0	0.	0.	0.	o.
52	70D	CP70	10.00	0	O	0	0.	0.	0.	0.
53	990	CP99	10.00	0	0	0	0.	0.	0.	0.
	7777		10.00	0	0	0	0.	0.	0.	V.
	1555		10.00	33	33	0	9.12	0.	9.12	80.49
	10E	CP10	10.00	10	10	0	2.76	0.	2.76	25.22
	20E	CP20	10.00	11	11	0	3.04	0.	3.04	24.44
	30E	CF30	10.00	8	8	Ö	2.21	0.	2.21	17.78
	40E	CP40	10.00	10	10	Ö	2.76	0.	2.76	22.22
	50E	CP50	10.00		5	Ŏ	1.38	0.	1.38	11.11

EXHIBIT D-5. (Continued)

	100	00/0	10.00		•					
61		CP60	10.00	0	0	0	0.	O.	Ű.	0.
62	700	CP70	10.00	0	0	0	0.	0.	0.	0.
63	99E	CF99	10.00	0	Ü	O	Q.	0.	0.	o.
64	3333		10.00	0	0	0	0.	0.	0.	0.
65	1111		10.00	1	1	Û	.28	0.	.28	2.22
6.6.	1 0F	CP10	10.00	5	5	0	1.38	0.	1.38	23.81
6.7	206	CP20	10.00	5	5	Û	1.38	0.	1.38	23.81 .
6.8	30F	CP30	10.00	4	4	Ŏ	1.10	o.	1.10	19.05
69	4 0F	CP40	10.00	ė	ż	ŭ	.55	ŏ.	.55	9.52
70	50F	CP50	10.00	٤	2					
						0	.55	0.	. 55	9.52
71	60F	CP60	10.00	0	0	Ü	0.	0.	.0.	Ģ.
72	70F	CP70	10.00	0	0	0	0.	O.	0.	0.
7 3	99F	CP99	10.00	0	0	0	0.	0.	0.	0.
74	3333		10.00	0	0	0	0.	0.	0.	0.
75	1111		10.00	3	3	0	.83	0.	.83	14.29
76	1 06	0P10	10.00	5	5	0	1.38	0.	1.38	15.63
77	206	CP20	10.00	Ö	Ō	Ö	0.	0.	0.	0.
78	306	CP30	10.00	ŏ	Ŏ	ŏ	ů.	ŏ.	•	ŏ.
79	406	CP40	10.00	ő	ŏ	_				_
				-		0	0.	0.	0.	0.
80	506	CP50	10.00	0	0	0	0.	0.	0.	0.
81	606	CP 6.0	10.00	0	0	0	Ű.	0.	0.	0.
82	706	CP70	10.00	0	0	0	0.	0.	0.	0.
83	996	CP99	10.00	0	0	0	0.	0.	0.	0.
84	3777		10.00	0	0	0	0.	0.	0.	0.
85	5111		10.00	27	27	Ŏ	7.46	o.	7.46	84.38
86	1 0H	CP10	10.00	2	2	ŏ	.55	o.	. 55	18.18
	20H	CP20	10.00	0	Õ	ŏ	_			
	30H			-	-		0.	0.	0.	0.
88		CP30	10.00	0	0	0	0.	0.	0.	0.
89	4 0H	CP40	10.00	0	0	0	0.	0.	0.	0.
90	50H	CP50	10.00	0	0	0	0.	0.	0.	0.
91	60H	CP60	10.00	0	0	0	u.	0.	0.	0.
92	70H	CP70	10.00	0	0 '	0	0.	0.	0.	0.
93	99H	CF99	10.00	0	0 .	0	0.	0.	0.	0.
94	????		10.00	Ŏ	Ŏ	Ŏ	o.	Ŏ.	Ŏ.	0.
95	1111		10.00	š	ğ	ŏ	2.49	ŏ.	2.49	81.82
96	101	CP10		-	4	-				
			10.00	4		0	1.10	0.	1.10	57.14
97	105	CP20	10.00	1	1	Ü	.58	0.	.28	14.29
98	301	CP30	10.00	0	0	0	0.	0.	0.	0.
99	401	CP40	10.00	0	0	0	0.	0.	· 0.	0.
100	501	CF 50	10.00	0	0	Û	0.	0.	0.	Ú.
101	601	CP60	10.00	Ó	0	0	O.	0.	0.	ő.
102	701	CP70	10.00	ŏ	ŏ	Ŏ	Ů.	Ò.	o.	ŭ.
103	991	CP99	10.00	ŭ	ŏ	ő		ŏ.	o.	
		CERR		-			0.			0.
104	3333		10.00	0	0	0	0	0.	0	0.
105	1111		10.00	2	2	0	.55	0.	.55	28.57
106	100	CP10	10.00	0	0	0	u.	0.	0.	0.
	20J	CP20	10.00	0	0	0	0.	0.	0.	0.
108	30J	CP30	10.00	0	0	0	0.	0.	0.	0.
	40J	CP40	10.00	0	0	0	0.	0.	0.	0.
	50J	CP50	10.00	o	Ŏ	Ò	0.	O.	0.	0.
	60J	CP60	10.00	ŏ	ŏ	Ŏ	ŭ.	o.	o.	o.
								õ.	Ŏ.	ŏ.
	70J	CP70	10.00	0	0	0	0.			0.
	99J	CP99	10.00	0	0	0	0.	0.	0.	
	3333		10.00	0	0	0	0.	0.	0.	0.
115	1111		10.00	11	11	0	3.04	0.		100.00
116	1 0K	CP10	10.00	5	5	0	1.38	0.	1.38	55.56
	20K	CP2 0	10.00	2	2	0	. 55	0.	. 55	22.22
118	30K	CP30	10.00	ō	ō	Ö	0.	o.	0.	0.
	40K	CP40	10.00	ŏ	ŏ	ŏ	ō.	o.	Ŏ.	Ö.
		CP50		Ö	ŏ	ŏ	0.	o.	ŏ.	Ö.
	50K		10.00							
	60K	CP60	10.00	0	0	0	0.	o.	0.	0.
155	70K	CP70	10.00	0	0	0	0.	0.	0.	n.
	99K	CP99	10.00	0	0	0	0.	0.	0.	0.
124	7777	•	10.00	0	0	0	0.	0.	0.	0.
-										

D-13

EXHIBIT D-5 (Continued)

125 4444		10.00	2	2	0	.55	O.	.55	22.22
126 10L	CP10	10.00	0	Q	Ű	0.	O.	0.	0.
127 20L	CF20	10.00	1	1	0	. 28	0.	.28	25.00
128 30L	CP30	10.00	2	2	0	. 55	O.	. 55	50.00
129 40L	CP40	10.00	0	0	0	0.	0.	0.	0.
130 50L	CP50	10.00	1	1	0	.28	0.	.28	25.00
131 60L	CF60	10.00	Û	0	0	0.	0.	0.	0.
132 70L	CP70	10.00	0	0	0	0.	0.	0.	0.
133 99L	CP99	10.00	0	0	Ú	0.	0.	0.	0.
134 ????		10.00	Û	0	0	0.	0.	0.	0.
135 1111		10.00	0	Ō	0	0.	0.	0.	0.

EXHIBIT D-6. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE DISTANCE FROM STERN--HULL RUPTURE

Maria Maria	•••••	*****	****	•••••	*****	****	• • • • • • • •	*****
HODE HOME? HO. HOME EVERT	HE LOHT			-N/N-	51	52	F·T	PP
1 LEVO PUPT	100.00	827	362		100.00	ű.	100.00	
2 PHS PHC	7.14	69	69	ò	30.40	ó.	30.40	30.40
3 PAR PAR	7.14	38	38	Ú	16.74	0.	16.74	16.74
4 PAD FAD	7.14	10	1.0	U	4.41	0.	4.41	4.41
5 PME PME	7.14	29	29	U	12.78	0.	12.78	12.70
6 KSB TSE	7.14	20	20	Ú	8.81	0.	8.81	8.81
7 FSD KSD	7.14	13	13	0	5.73	0.	5.73	5.73
SIEZ LET	7.14	25	25	Ŭ	11.01	0.	11.01	11.01
9 VED LED	7.14	9	9	0	3.96	0.	3.96	3.95
10 KED HER 11 UPC UPC	7.14 7.14	0	0 6	0	0. 2.64	0. 0.	0. 2.64	0. 2.64
12 LWG LWG	7.14	6 4	4	0	1.76	0.	1.76	1.76
13 COM COM	7.14	3	3	õ	1.32	Ö.	1.32	1.32
14 77??	7.14	ŏ	ŏ	ů	0.	o.	0.	0.
15 1111	7.14	1	1	0	. 44	0.	.44	.44
16 10A CP10	10.00	24	24	O	10.57	0.	10.57	34.78
17 20A CP20	10.00	17	17	0	7.49	0.	7.49	24.64
18 30A CP30	10.00	9	9	0	3.96	o.	3.96	13.04
19 40A CP40	10.00	7	7	0	3.08	0.	3.08	10.14
20 508 CP50	10.00	2	2	0	.88	0.	.88	2.90
21 60A CP60 22 70A CP70	10.00 10.00	1 1	1 1	0	.44	0. 0.	.44	1.45 1.45
23 99A CP99	10.00	Ó	ò	Ö	0.	o.	0.	0.
24 ????	10.00	ŏ	ŏ	ŏ	0.	ō.	ő.	ŏ.
25 \$118	10.00	ě	ě	ŭ	3.52	Ű.	3.52	11.59
26 10B CF10	10.00	7	7	0	3.08	0.	3.08	18.42
27 20B CF20	10.00	7	7	0	3.08	0.	3.08	18.42
28 30B CP30	10.00	7	7	Ü	3.08	0.	3.08	18.42
29 40E CF40	10.00	10	10	0	4.41	0.	4.41	26.32
30 50B CP50	10.00	4	4	0	1.76	0.	1.76	10.53
31 60B CP60	10.00	Ů	0	0	0.	0. 0.	0. .44	0. 2.63
32 70B CP70 33 99B CP99	10.00 10.00	1 1	1	0	.44	0.	.44	2.63
34 ????	10.00	Ô	ô	ŏ	υ.	ů.	0.	0.
35 \$\$\$\$	10.00	ĭ	i	Ŏ	.44	ø.	.44	2.63
36 10C CP10	10.00	3	3	0	1.32	0.	1.32	30.00
37 200 CP20	10.00	2	2	0	.88	0.	.88	20.00
38 30C CP30	10.00	3	3	0	1.32	0.	1.32	30.00
39 400 CP40	10.00	1	1	0	. 44	0.	, 44	10.00
40 500 CP50	10.00	0	0	0	0.	0.	0.	0.
41 600 CP60 42 700 CP70	10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
43 99C CP99	10.00	ŏ	ŏ	ŏ	0.	o.	o.	o.
44 ????	10.00	ŏ	ŏ	ŏ	Ŏ.,	Ŏ.	Ŏ.	Ŏ.
45 \$\$\$\$	10.00	i	i	Ō	. 44	0.	.44	10.00
46 10D CP10	10.00	2	2	0	. 88	0.	. 88	6.90
47 200 CP20	10.00	0	0	0	U.	0.	0.	0.
48 30D CP30	10.00	0	0	0	0.	0.	0.	0.
49 40D CP40	10.00	0	0	0	0.	0.	0.	0.
50 50D CP50 51 60D CP60	10.00	0	0	0	0. 0.	0. 0.	0. • 0.	0. 0.
52 70D CP70	10.00 10.00	ŏ	Ö	ŏ	0.	ŏ.	0.	0.
53 99D CP99	10.00	ŏ	Ŏ	ŏ	0.	ŏ.	o.	Ŏ.
54 ????	10.00	ŏ	ŏ	ŏ	o.	o.	o.	o.
55 \$141	10.00	27	27	ŏ	11.89	0.	11.89	93.10
56 10E CP10	10.00	4	4	0.	1.76	0.	1.76	20.00
57 20E CP20	10.00	5	5	0	2.20	0.	05.5	25.00
58 30E CP30	10.00	5	5	0	2.20	0.	2.20	25.00
59 40E CP40	10.00	4	4	Ü	1.76	0.	1.76	20.00
60 50E CP50	10.00	2	5	0	.88	0.	. 88	10.00
61 60E CP60 62 70E CP70	10.00	0	0	- 0	0. 0.	0. 0.	0. 0.	0. 0.
63 99E CP99	10.00	Č	ŏ	ŏ	v.	o.	Ŏ.	0.
64 ????	10.00	ŭ	ŏ	ō	v.	o.	ő.	Ŏ.

EXHIBIT D-6. (Continued)

65	1111		10.00	0	Ú	0	v.	0.	0.	0.
66	1 OF	CP10	10.00	غ	è	ò	.88	õ.	. 88	15.38
67	.:0F	CP20	10.00	4	4	()	1.76	0.	1.76	30.77
68	30F	CP30	10.00	1	1	(I	. 44	0.	. 44	7.69
69		CP40	10.00	i	1	Ü	.44		.44	7.69
						-		0.		
70	5.0F	OP 5.0	10.00	5	2	0	.88	0.	.88	15.38
71	6.0F	CP(0,0)	10.00	Ú	0	0	0.	O.	Û.	0.
72	7.0F	CP70		Ó	Ü					
			10.00			()	u.	o.	0.	0.
- 73	99F	CPRR	10.00	Û	0	Ü	U.	0.	0.	O.
74	????		10.00	0	0	0	O.	0.	0.	0.
						-				
75	4.1.1.4		10.00	3	3	Û	1.32	O.	1.32	23.08
76	1.06	CP10	10.00	3	3	Û	1.32	0.	1.32	12.00
77	206	CP20	10.00	0	0	0	0.	0.	Ü.	0.
78	306	CP30	10.00	Û	Û	Ü	0.	0.	O.	Ű.
79	4.05	CP40	10.00	0	0	0	u.	0.	0.	0.
80	506	CP50	10.00	Ò	Ó	Ö	0.	Ů.	o.	Û.
				-						_
81	606	CP60	10.00	Ü	0	Û	0.	0.	Q	0.
88	706	CP70	10.00	0	Û	Ŭ	Ű.	Ú.	0.	0.
83	996	CP99	10.00	ŏ	ă	Õ				Ö.
		Urzz					0.	0.	0.	
84	3333		10.00	Û	0	0	0.	0.	.0.	0.
85	1111		10.00	22	22'	0	9.69	0.	9.69	88.00
		CD40								
86	1 OH	CP10	10.00	خ	2	0	.88	0.	.88	22.22
87	SOH	CP20	10.00	0	0	Ú	ΰ.	0.	0.	0.
88	30H	CP30	10.00	0	0	0	0.	0.	0.	0.
					-			_		
89	4 üH	CP40	10.00	0	· 0	O	0.	0.	0.	o.
90	50H	CP50	10.00	0	û	0	Ű.	0.	0.	Û.
91	6 0H	CP60	10.00	0	0	0	0.	0.	0.	0.
92	70H	CP70	10.00	Û	0	0	0.	O.	0.	0.
93	9911	CP99	10.00	0	0	0	0.	٥.	0.	0.
94	????		10.00	0	Ô	0	ø.	0.	0.	0.
95	3.3.4.1		10.00	7	7	Ü	3.09	0.	3.08	77.78
96	101	CP10.	10.00	0	0	0	Û.	0.	٥.	0.
	108	0290	10.00	Ŏ	Ŏ	Ŏ	Ü.	o.	0.	0.
					-	-		_		
9 8	301	CP30	10.00	0	0	0	0.	0.	0.	0.
99	401	CP40	10.00	0	0	0	0.	0.	0.	0.
		CP50		ŏ		-			0.	O.
100			10.00	-	0	0	0.	0.		
101	60I	CP60	10.00	0	0	0	0.	0.	0.	0.
102	701	CP70	10.00	0	0	0	0.	0.	0.	0.
				_		_				
103	991	CP99	10.00	0	0	0	0.	0.	0.	0.
104	????		10.00	0	0	0	0.	0.	. 0.	0.
1 05	5355		10.00	0	0	. 0	0.	0.	0.	0.
		0010							2.7	
106	10J	CP10	10.00	0	0	0	0.	0.	0.	0.
107	20J	CP20	10.00	0	0	0	0.	0.	0.	0.
103	30J	CP30	10.00	0	0	0	U.	0.	0.	0.
				-						
109	40J	CP40	10.00	Û	0	0	0.	0.	0.	0.
110	50J	CP50	10.00	0	0	0	O.	0.	0.	0.
111		CP60	10.00	Ŏ.	Ò	ò	0.	Ö.	0.	Õ.
								_	_	
112		CP70	10.00	0	0	0	0.	0.	0.	0.
113	99.J	CP99	10.00	0	0	0	0.	0.	0.	0.
	????	• • • • • • • • • • • • • • • • • • • •	10.00	Ö	Ŏ	Ċ	0.	0.	0.	0.
	1111		10.00	6	6	0	2.64	0.		100.00
116	1 0K	CP10	10.00	2	2	0	.88	0.	.88	50.00
117				ō			_		_	
111			10.00		0	0	0.	0.	0.	0.
	30K	CP30	10.00	0	0	0	u.	0.	0.	0.
119	4 0K	CP40	10.00	0	0	0	0.	0.	0.	0.
										_
120		CP50	10.00	0	0	0	0.	0.	0.	0.
121	60K	CP60	10.00	0	0	U	u.	0.	0.	0.
122		CP70	10.00	Ô	Ö	O	0.	0.	0.	0.
123		CP99	10.00	0	0	0	0	0.	0.	o.
124	77??		10.00	0	0	0	ŋ.	0.	0.	0.
	1111		10.00	2	2	0	.88	0.	.88	50.00
							-			
156	1 AL	CP10	10.00	0	0	0	0.	0.	0.	0.

EXHIBIT D-6 (Continued)

127 20L 128 30L	0840 0840	10.00	1 2	1 2	0	.44 .88	0. 0.	.44 .88	33.33 66.67
129, 40L	CP40	10.00	0	Ō	0	0.	0.	0.	0.
130 50L 131 60L	CP50 CP60	10.00 10.00	0 Ü	0	0	0. 0.	0. 0.	0. 0.	0. 0.
132 70L	CP70	10.00	0	0	0	0.	ø.	0. 0.	0. 0.
133 99L 134 ????	CP99	10.00 10.00	0	0	0	0. 0.	0. 0.	o.	0.
135 4444		10.00	0	0	Ų	u.	0.	0.	0.

(m)

EXHIBIT D-7. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE DISTANCE FROM STERN--CRACKS/FRACTURES

•••••	•••••	•••••	••••	•••••	•••••	****	•••••	•••••
NODE HAME?		HL.L.	_					
NO. MAME EVENT						52		
1 LEVO STEP	100.00	139	436		100.00	0.		100.00
a PAS PAS	7.14	51	51	0	36.69	0.	36.69	36.69
3 PAR FAR	7.14	13	13	0	9.35	0.	9.35	9.35
4 PAD PAD	7.14	8	8	0	5.76	0.	5.76	5.76
. 5 PAE PAE	7.14	16	16	0	11.51	0.	11.51	11.51
6 KSB KSB	7.14	12	12	0	8.63	0.	8.63	8.63
7 KSD KSD	7.14	6	6	0	4.32	0.	4.32	4.32
8 KES FES	7.14	18	18	0	12.95	0.	12.95	12.95
9 KED KED	7.14	6	6	0	4.32	0.	4.32	4.32
10 KEB KEB	7.14	Û	0	0	Ü.	0.	0.	0.
11 UPC UPC	7.14	6	6	0	4.32	0.	4.32	4.32
12 LWC LWC	7.14	1	1	0	.72	Û.	.72	.72
13 CDM CDM	7.14	1	1	0	.72	0.	.72	.72
14 ????	7.14	0	0	0	0.	0.	0.	0.
15 \$\$\$\$	7.14	1	1	U	.72	0.	.72	.72
16 10A CP10	10.00	19	19	0	13.67	0.	13.67	37.25
17 20A CP20	10.00	9	9	0	6.47	0.	6.47	17.65
18 30A CP30	10.00	6	6	0	4.32	0.	4.32	11.76
19 40A CP40	10.00	5	5	Ū	3.60	0.	3.60	9.80
20 50A CP50	10.00	2	2	0	1.44	0.	1.44	3.92
21 60A CP60	10.00	1	1	0	.72	0.	.72	1.96
22 70A CP70	10.00	1	1	0	.72	0.	.72	1.96
23 99A CP99	10.00	0	0	U	0.	0.	0.	0.
24 ????	10.00	0	0	0	0.	0.	0.	0.
25 \$\$\$\$	10.00	8	8	0	5.76	0.	5.76	15.69
26 10B CP10	10.00	1	1	0	.72	0.	.72	7.69
27 20B CP20	10.00	3	3	Ø	2.16	0.	2.16	23.08
28 30B CP30	10.00	4	4	0	2.88	0.	2.88	30.77
29 40B CP40	10.00	5	5	0	3.60	0.	3.60	38.46
30 50R CP50	10.00	0	0	0	Û.	0.	0.	0.
31 60k CP60	10.00	Û	0	0	0.	0.	0.	0.
32 70B CP70	10.00	0	0	U	0.	0.	0.	0.
33 99R CP99	10.00	0	0	0	0.	0.	0.	0.
34 ????	10.00	0	0	0	0.	0.	0.	0.
35 \$\$\$\$	10.00	0	0	0	0.	0.	٥.	0.
36 10C CP10	10.00	3	3	0	2.16	0.	2.16	37.50
37 20C CF20	10.00	2	2	0	1.44	ű.	1.44	25.00
38 300 CP30	10.00	2	2	0	1.44	0.	1.44	25.00
39 40C CP40	10.00	0	0	0	0.	0.	0.	0.
40 500 CP50	10.00	0	0	0	υ.	0.	0.	0.
41 60C CP60	10.00	0	0	0	0.	0.	0.	0.
42 70C CP70	10.00	0	0	0	0.	0.	0.	0.
43 990 CP99	10.00	0	0	0	0.	0.	0.	0.
44 ????	10.00	0	0	0	0.	0.	0.	0.
45 1155	10.00	1	1	0	.72	0.	.72	12.50
46 10D CP10	10.00	1	1	0	.72	0.	.72	6.25
47 20D CP20	10.00	0	0	0	0.	0.	0.	0.
48 30D CP30	10.00	0	0	0	v.	0.	0.	0.
49 40D CP40	10.00	0	0	0	0.	0.	0.	0.
50 50D CP50	10.00	0	0	0	0.	0.	0.	0.
51 60D CP60	10.00	0	0	0	0.	0.	0.	0.
52 70D CP70	10.00	0	0	0	0.	0.	0.	0.
53 99D CP99	10.00	0	0	0	u.	0.	0.	0.
54 ????	10.00	0	0	0	0.	0.	0.	0.
55 \$5\$\$	10.00	15	15	0	10.79	0.	10.79	93.75
56 10E CP10	10.00	3	3	0	2.16	0.	2.16	25.00
57 20E CP20	10.00	2	2	0	1.44	0.	1.44	16.67
58 30E CP30	10.00	3	3	0	2.16	0.	2.16	25.00
59 40E CP40	10.00	2	5	0	1.44	0.	1.44	16.67
60 50E CP50	10.00	2	2	Ō	1.44	0.	1.44	16.67
61 60E CP60	10.00	0	0	0	U.	0.	0.	0.
62 70E CP70	10.00	Ó	0	Ö	0.	0.	0.	0.
63 99E CP99	10.00	0	0	0	0.	0.	0.	0.
64 7???	10.00	0	0	0	0.	0.	0.	0.
65 \$\$\$\$	10.00	0	0	U	0.	0.	0.	0.

		EX	HIBIT	D-7.	(Conti	nued)		
66 10F CP10	10.00	1	1	0	.72	0.	.72	
67 20F CP20 68 30F CP30	10.00 10.00	1 0	1 0	0	.72 0.	0. 0.	.72 0.	16.67 0.
69 40F CP40	10.00	Ö	ŏ	Ö	o.	0.	ŏ.	0.
70 50F CP50	10.00	٤	2	0	1.44	0.	1.44	33.33
71 60F CP60 72 70F CP70	10.00 10.00	0	0	U O	0. 0.	0. 0.	0. 0.	0. 0.
73 99F CP99	10.00	ò	ŏ	ŏ	o.	0.	ò.	0.
74 ????	10.00	0	Ů.	0	0.	0.	0.	0. 33.33
75 1111 76 105 CP10	10.00 10.00	ے 1	ج 1	0	1.44 .72	0. 0.	1.44	5.56
77 20G CP20	10.00	0	0	0	0.	0.	0.	0.
78 306 CP30 79 406 CP40	10.00 10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
79 406 CP40 80 506 CP50	10.00	ő	Ô	Ô	0.	0.	0.	0.
81 606 CP60	10.00	0	0	0	0.	0.	0.	0.
82 706 CP70 83 996 CP99	10.00 10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
84 7???	10.00	ŏ	ŏ	ŏ	o.	õ.	0	ŏ.
85 1111	10.00	17	17	0	12.23	0.	12.23	94.44
86 10H CP10 87 20H CP20	10.00 10.00	1	1	0	.72 0.	0. 0.	.72 0.	16.67
88 30H CP30	10.00	ŏ	ŏ	Ö	o.	o.	0.	0.
89 40H CP40	10.00	0	0	0	0.	0.	0.	0.
90 50H CP50 91 60H CP60	10.00 10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
92 70H CP70	10.00	Ŏ	ő	ŏ	ō.	Ó.	0.	0.
93 99H CP99	10.00	0	0 0	0	0.	0.	0.	0.
94 ???? 95 \$\$\$\$	10.00 10.00	0 5	5	0	0. 3.60	0. 0.	0. 3.60	0. 83.33
96 101 CP10	10.00	0	0	0	0.	0.	0.	0.
97 201 CP20 98 301 CP30	10.00	0	0	0	0.	0. 0.	0. 0.	o. o.
98 301 CP30 99 401 CP40	10.00 10.00	Ö	0	Ö	0. U.	0.	0.	0.
100 501 CP50	10.00	0	0	0	0.	0.	0.	0.
101 601 CP60 102 701 CP70	10.00 10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
102 701 CF70	10.00	ŏ	Õ	ő	o.	0.	0.	ŏ.
104 ????	10.06	0	0	0	0.	0.	0.	0.
105 \$\$\$\$ 106 10J CP10	10.00 10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
107 20J CP20	10.00	ŏ	ŏ	Ō	0.	o.	o.	o.
108 30J CP30	10.00	0	0	0	0.	0.	0.	0.
109 40J CP40 110 50J CP50	10.00 10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
111 60J CP60	10.00	0	0	0	0.	0.	0.	0.
112 70J CP70 113 99J CP99	10.00 10.00	0	0	0	0.	0. 0.	0. 0.	0. 0.
114 ????	10.00	0	ŏ	ŏ	0. 0.	o.	o.	o.
115 \$\$\$\$	10.00	6	6	0	4.32	0.	4.32	100.00
116 10K CP10 117 20K CP20	10.00 10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
118 30K CP30	10.00	ŏ	ŏ	ŏ	o.	ŏ.	o.	ŏ.
119 40K CP40	10.00	0	0	0	0.	0.	Q.	0.
120 50K CP50	10.00 10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
122 70K CP70	10.00	0	ŏ	Ŏ	o.	Ŏ.	o.	O.
123 99K CP99	10.00	0	0	0	0.	0.	0.	0.
124 ???? 125 \$\$\$\$	10.00 10.00	0	0 1	0	0.	0. 0.	0. .72	0.
126 10L CP10	10.00	0	0	Ö	0.	0.	0.	0.
127 20L CP20 128 30L CP30	10.00	1	1	0	.72	0.		100.00
128-30L CP30 129-40L CP40	10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
130 50L CP50	10.00	0	0	0	0.	0.	0.	0.
131 60L CP60 132 70L CP70	10.00	0	0	0	0. U.	0. 0.	0. 0.	0. 0.
133 99L CP99	10.00	ŏ	Ŏ	ŏ	0.	0.	0.	Ŏ.
134 7777	10.00	0	0	0	0.	0.	0.	0.
135 \$\$1\$	10.00	0	0	0	U.	0.	0,	0,

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EXHIBIT D-8. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE DISTANCE FROM STERN--HOLES

	DIS	1211013	i itoli i	J LLIKIN-	HOLL			
NDDE NAME?	••••••	HLL	• • • • • •	*****	******	*****	•••••	•••••
NO. NOME EVENT	WE 16HT		6	-11/0-	51	55	PT	PP
1 LEVO 31(9	100.00	87	347		100.00	0.		100.00
2 PAS PAS	7.14	21	21	Û	24.14	0.	24.14	24.14
3 PAR PAR 4 PAR PAR	7.14 7.14	20 3	3 20	υ 0	22.99 3.45	0. 0.	22.99 3.45	22.99 3.45
4 PAD PAD 5 PAE PAE	7.14	12	12	Ů	13.79	0.	13.79	13.79
6 KSB KSB	7.14	8	8	ŏ	9.20	ő.	9.20	9.20
7 KSD KSD	7.14	6	6	0	6.90	0.	6.90	6.90
8 KES KES	7.14	7	7	0	8.05	0.	8.05	8.05
9 KED KED 10 KEB KEB	7.14 7.14	3 0	3	0	3.45 U.	0. 0.	3.45 0.	3.45 0.
11 UPC UPC	7.14	í	1	ő	1.15	o.	1.15	1.15
12 LWC LWC	7.14	3	3	Ŏ	3.45	o.	3.45	3.45
13 COM COM	7.14	2	2	0	2.30	0.	2.30	2.30
14 ????	7.14	0	0	0	0.	0.	0.	0.
15 1111 16 10A CP10	7.14	1 6	1 6	0	1.15 6.90	0. 0.	1.15 6.90	1.15
17 20H CF20	10.00	9	9	0	10.34	0.	10.34	42.86
18 30A CP30	10.00	ž	3	ŏ	3.45	Õ.	3.45	14.29
19 40A CP40	10.00	3	3	0	3,45	0.	3.45	14.29
20 50A CP50	10.00	0	0	0	0.	0.	0.	0.
21 60A CP60	10.00	0	0	0	0.	0.	0.	0.
22 70A (P70 23 99A (P99	10.00 10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
24 ????	10.00	Ŏ	ő	0	0.	o.	0.	o.
25 1111	10.00	Ŏ	Ŏ	Ö	o.	0.	0.	o.
26 10F CP10	10.00	6	6	0	6.90	0.	6.90	30.00
27 20B CP20	10.00	4	4	0	4.60	0.	4.60	20.00
28 308 CP30 29 40B CP40	10.00	2	2	0	2.30 4.60	0.	2.30 4.60	10.00
29 40B CP40 30 50B CP50	10.00	4	3	0	3.45	0. 0.	3.45	15.00
31 60B CP60	10.00	ŏ	ŏ	ŏ	0.	ŏ.	0.	0.
32 70% CP70	10.00	0	0	0	0.	0.	0.	Ű.
33 99B CP99	10.00	O	0	0	0.	0.	0.	0.
34 ????	10.00	0	0	0	0.	0.	0.	0.
35 \$\$\$\$ 36 100 CP10	10.00	1 0	1 0	0	1.15	0. 0.	1.15	5.00 0.
37 200 CP20	10.00	ĭ	ĭ	ŏ	1.15	ŏ.	1.15	33.33
38 30C CP30	10.00	1	1	0	1.15	0.	1.15	33.33
39 40C CP40	10.00	1	1	0	1.15	0.	1.15	33.33
40 500 CP50	10.00	0	0	0	0.	0.	0.	0.
41 600 CP60 42 700 CP70	10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
43 99C CP99	10.00	ŏ	ŏ	ŏ	o.	ŏ.	ŏ.	ŏ.
44 ????	10.00	0	0	0	0.	0.	0.	0.
45 3555	10.00	0	0	0	0.	0.	0.	0.
46 10D CP10 47 20D CP20	10.00 10.00	1 0	1 0	0	1.15	0.	1.15 0.	8.33 0.
48 30D CP30	10.00	ŏ	ŏ	ő	0.	0. 0.	0.	0.
49 40D CP40	10.00	ŏ	Ŏ	ŏ	0.	Ŏ.	Ö.	o.
50 50D CP50	10.00	0	0	0	0.	0.	0.	0.
51 60D CP60	10.00	0	0	0	0.	0.	0.	0.
52 70D CP70 53 99D CP99	10.00	0	0	0	0.	0.	0.	0.
54 ????	10.00	Ŏ	Ŏ	0	0. 0.	0. 0.	0. 0.	0. 0.
55 \$\$\$\$	10.00	11	11	ŏ	12.64	Ŏ.	12.64	91.67
56 10E CP10	10.00	2	2	Ö	2.30	0,	2.30	25.00
57 20E CP20	10.00	2	5 5	0	2.30	0,	2.30	25.00
58 30E CP30	10.00	5	2	0	2.30	0.	2.30	25.00
59 40E CP40 60 50E CP50	10.00	9	0	0	2.30 0.	0. 0.	2.30 0.	25.00 0.
61 60E CP60	10.00	ŏ	ŏ	ŏ	0.	o.	o.	0.
62 70E CP70	10.00	ō	Ŏ	ŏ	o.	Ŏ.	o.	0.
63 99E CP99	10.00	0	0	0	0.	0.	0.	0.
64 7777	10.00	0	0	0	0.	0.	0.	0.

				E	XHIBIT	D-8.	(Cont	inued)		
66		CP10	10.00	1	1	0	1.15	0.	1.15	
- 67 - 68		CP20 CP30	10.00 10.00	3 0	3 0	0	3.45 0.	0. 0.	3.45 0.	50.00 0.
69		CP40	10.00	ĭ	1	ŏ	1.15	0.	1.15	16.67
	50F	CP50	10.00	Ö	Ō	Ö	0.	0.	0.	0.
71		CP60	10.00	0	O	0	0.	0.	O.	0.
72		CP70	10.00	0	0	0	0.	0.	0.	0.
73 74		CP99	10.00 10.00	0	0	0	0. 0.	0. 0.	0. 0.	0.
	1111		10.00	1	ĭ	0	1.15	0.	1.15	0. 16.67
76		CP10	10.00	٤	خ	Õ	2.30	o.	2.30	28.57
77		CP20	10.00	0	Û	0	0.	0.	0.	0.
78		CP 30	10.00	0	0	0	0.	0.	0.	0.
79	4 06 5 06	CP40 CP50	10.09 10.00	0	0	0	0. V.	0. 0.	0. 0.	0. 0.
81		CP60	10.00	Ŏ	ŏ	Ŏ	0.	0.	o.	0.
82		CP70	10.00	Ó	ò	ŏ	õ.	ō.	Ŏ.	o.
83		CP99	10.00	0	0	0	0.	0.	0.	O.
84			10.00	0	0	0	0.	0.	0.	0.
85		CD46	10.00	5	5	0	5.75	0.	5.75	71.43
86 97	10H 20H	CP10 CP20	10.00 10.00	1	1	0	1.15 0.	0. 0.	1.15	33.33 0.
88		CP30	10.00	Ö	0	Ö	0.	0.	0.	0.
	4 0H	CP40	10.00	ŏ	Õ	ŏ	o.	0.	ő.	ŏ.
90	50H	CP50	10.00	0	0	0	0.	0.	0.	0.
91	6.0H	CP60	10.00	0	0	0	0.	0.	0.	0.
95		CP70	10.00	0	0	0	0.	0.	0.	0.
93 94	3333 99H	CP99	10.00 10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
95	4.5.5.5		10.00	ž	Š	ő	2.30	0.	2.30	66.67
96	101	CP10	10.00	ō	Ō	Ŏ	0.	O.	0.	0.
97	501	CP20	10.00	0	Û	Ü	0.	0.	0.	0.
93		CP30	10.00	0	0	0	0.	0.	0.	0.
99 100	401 501	CP40 CP50	10.00	0	0	0	0.	0.	0.	0.
101	601	CP60	10.00 10.00	Ö	Ö	0	0. 0.	0. 0.	0. 0.	0. 0.
102	701	CP70	10.00	ŏ	ŏ	ŏ	ů.	Ŏ.	ŏ.	ŏ.
103	991	CP99	10.00	Ò	O	0	0.	O.	0.	0.
104	3333		10.00	0	0	0	0.	0.	0.	0.
105	1111	CDIA	10.00	0	0	0	0.	0.	0.	0.
106 107	10J 20J	CP10	10.00 10.00	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
108	303	CP30	10.00	ŏ	ŏ	ŏ	o.	Ö.	0.	ŏ.
109	40J	CP40	10.00	0	0	Ö	0.	0.	0.	0.
	50.	CP50	10.00	0	0	0	0.	0.	0.	0.
	60J	CP60	10.00	0	0	0	0.	0.	0.	0.
	70J 99J	CP70 CP99	10.00 10.00	0	0	0	0.	0.	0.	0.
	7777	UFFF	10.00	ŏ	Ŏ	0	0.	0. 0.	0. 0.	0. 0.
	1111		10.00	ĭ	ĭ	ŏ	1.15	0.	1.15	
	1 0K	CP10	10.00	2	2	0	2.30	0.	2.30	66.67
	50K	CP20	10.00	0	0	0	0.	0.	0.	0.
	30K 40K	CP30 CP40	10.00 10.00	0	0	0	0.	0.	0.	0.
	50K	CP50	10.00	Ŏ	ŏ	Ŏ	0. 0.	0. 0.	0. 0.	0. 0.
	60K	CP60	10.00	ŏ	ŏ	ŏ	0.	Ŏ.	ŏ.	ő.
22	70K	CP70	10.00	0	0	0	0.	0.	0.	o.
	99K	CP99	10.00	0	0	0	0.	0.	0.	0.
	7777		10.00	0	0	0	0.	0.	0.	0.
	\$\$\$\$ 10L	CP10	10.00 10.00	1	1 0	0	1.15	0.	1.15	33.33
	SOF	CP20	10.00	ŏ	Ö	Ö	0. 0.	0. 0.	0. 0.	0. 0.
	30L	CP30	10.00	ž	ě	ŏ	2.30	o.		100.00
29	4 OL	CP40	10.00	0	0	0	0.	0.	0.	0.
	50L	CP50	10.00	0	0	0	0.	0.	0.	0.
	60L	CP60	10.00	0	0	0	0.	0.	0.	0.
	70L 99L	CF70 CP99	10.00	0	0	0	0.	0. 0.	0. 0.	0. 0.
	7777	W. 75	10.00	ŏ	ŏ	ŏ	0.	0.	0.	0.
			10.00		ň	ň	0	^	^	•

EXHIBIT D-9. LOGIC TREE FOR ANALYZING FREQUENCY OF SIDE HULL RUPTURE IN LONGITUDINAL AND VERTICAL MATRIX

•••••	•••••	• • • • • •	••••	•••••	•••••	*****	• • • • • •	*****
NODE HAME?		ĦLL						
NO. HAME EVENT					51	25	PT	
1 LEVO PAI	100.00	238 157	757	0	100.00 65.97	0. 0.	100.00 65.97	100.00 65.97
2 BOW BOW1 3 STRM STEP	25.00 25.00	99 157	157 69	0	28.99	0.	28.99	28.99
4 7777	25.00	0	ő	ő	0.	Õ.	0.	Ů.
5 1111	25.00	12	12	ő	5.04	Õ.	5.04	5.04
6 B10 CP10	10.00	57	57	ò	23.95	0.	23.95	36.31
7 B20 CP20	10.00	28	28	0	11.76	0.	11.76	17.83
8 B30 CF30	10.00	28	28	0	11.76	0.	11.76	17.83
9 840 (P40	10.00	12	12	0	5.04	0.	5.04	7.64
10 B50 CP50	10.00	15	15	0	6.30	0.	6.30	9.55
11 B60 CP60	10.00	8	8	0	3.36 .84	0.	3.36	5.10 1.27
12 B70 CP70 13 B99 CP99	10.00	2	2	0	.42	0. 0.	.42	.64
14 7777	10.00	Ô	ò	0	0.	o.	0.	0.
15 1111	10.00	ě	ě	ŏ	2.52	o.	2.52	3.82
16 510 CP10	10.00	24	24	Ü	10.08	0.	10.08	34.78
17 S20 CP20	10.00	17	17	0	7.14	0.	7.14	24.64
18 \$30 CP30	10.00	9	9	Û	3.78	0.	3.78	13.04
19 S40 CP40	10.00	7	7	0	2.94	0.	2.94	10.14
20 350 CP50	10.00	۽	ē	0	.84	0.	.84	2.90
21 360 CP60	10.00	1	1	0	.42	0.	.42	1.45
22 S70 CP70 23 S99 CP99	10.00	1	1	0	.42	0.	.42	1.45
23 S99 CP99 24 ????	10.00	υ 0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
25 3448	10.00	8	ě	Û	3.36	0.	3.36	11.59
26 25A V25	14.29	7	7	ŏ	2.94	ŏ.	2.94	12.28
27 50A V50	14.29	15	15	0	6.30	0.	6.30	26.32
28 75A V75	14.29	11	11	0	4.62	0.	4.62	19.30
29 100A V100	14.29	13	13	0	5.46	0.	5.46	22.81
30 500A V500	14.29	8	8	0	3.36	0.	3.36	14.04
31 ????	14.29	0	0	0	Û.	0.	0.	0.
32 \$\$\$\$ 33 258 V25	14.29	3	3	0	1.26	0.	1.26	5.26 21.43
33 258 V25 34 508 V50	14.29	6	6	0	2.52 2.52	0. 0.	2.52 2.52	21.43
35 75B V75	14.29	4	4	Ű	1.68	0.	1.68	14.29
36 100E V100	14.29	4	4	ŏ	1.68	ő.	1.68	14.29
37 500B V500	14.29	. 8	8	ŏ	3.36	o.	3.36	28.57
38 ????	14.29	0	0	0	0.	0.	0.	0.
39 \$5\$\$	14.29	Ü	0	0	0.	0.	0.	0.
40 250 V25	14.29	2	2	0	.84	0.	.84	7.14
41 500 V50	14.29	6	6	0	2.52	0.	2.52	21.43
42 750 V75 43 1000 V100	14.29	6 7	6	0	2.52 2.94	0.	2.52 2.94	21.43 25.00
43 1000 V100 44 5000 V500	14.29 14.29	7	7	0	2.94	0. 0.	2.94	25.00
45 ????	14.29	ó	Ó	ΰ	0.	0.	0.	0.
46 1111	14.29	ŏ	Ŏ	ŏ	o.	0.	0.	Ö.
47 25D V25	14.29		2	0	. 84	0.	.84	16.67
48 50D V50	14.29	2 3 2	2	9	. 84	0.	.84	16.67
44 750 V75	14.29	3	2 3 2 3	0	1.26	0.	1.26	25.00
	14.29	5	5	0	.84	0.	.84	16.67
1 500h V500	14.29	3		0	1.26	0.	1.26	25.00
500 \$444	14.29	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
14 44 1000	14.29	4	4	ŏ	1.68	0.	1.68	26.67
56 75E V75	14.29	1	1	Ó	.42	Ŏ.	.42	6.67
100E V100	14.29	4	4	O	1.68	0.	1.68	26.67
58 500E V500	14.29	6	6	0	2.52	0.	2.52	40.00
59 ????	14.29	0	0	0	0.	0.	0.	0.
60 1115	14.29	0	0	0	0.	0.	0.	0.
61 25F V25	14.29	3	0	0	0.	0.	0.	0.
62 50F V50 63 75F V75	14.29	2	3 2 2	Q U	1.26	0. 0.	1.26	37.50
64 100F V100	14.29	٤	2	0	. 84	0.	.84	25.00 25.00
65 500F Y500	14.29	ō	ō	ŏ	0.	o.	0.	0.
66 7777	14.29	Ö	Ŏ	ŏ	o.	o.	ŏ.	o.

(11)

					EXHIBIT	D-9.	(Con	tinued)		
	1111		14.29	1	1	0	.42	0.	.42	
68	256	V25	14.29	0	0	Û Û	0.	0.	0.	0.
69 70	506 756	V50 V75	14.29 14.29	0	0 0	0	0. 0.	0. 0.	0. 0.	0. 0.
71		V100	14.29	ĭ	ĭ	Ö	.42	0.	.42	50.00
	5006	V500	14.29	i	ī	ŏ	.42	0.	.42	50.00
73	7777		14.29	0	Ü	0	0.	0.	0.	0.
	5553		14.29	Ō.	0	0	0.	0.	0.	0.
	25H	V25	14.29	Û	o	0	0.	0.	0.	0.
76	50H 75H	V50 V75	14.29 14.29	0	Ů O	0	0.	0. 0.	0. 0.	0. 0.
·77 78		V100	14.29	1	í	ő	0. .42	0.		100.00
79	500H	V500	14.29	Ô	ō	ŏ	0.	0.	0.	Û.
80	????		14.29	Ù	0	0	0.	0.	0.	0.
81	2111	10.7 (2.	14.29	0	0	0	0.	0.	0.	0.
	251	V25	14.29	3	3	0	1.26	0.	1.26	12.50
	501	V50 V75	14.29	7 7	7 7	0	2.94	0. 0.	2.94	29.17 29.17
	751	V100	14.29	2	ۼ	0	.84	0.	.84	8.33
86	5001	V500	14.29	5	5	ŏ	2.10	ű.	2.10	20.83
	7777	. •	14.29	Ō	Ö	Ŏ	0.	0.	0.	0.
88	\$\$\$\$		14.29	0	0	0	v.	0.	0.	0.
	25J	V25	14.29	2	2 2	0	.84	0.	.84	11.76
	50J	V50	14.29	5	2	0	.84	0.	.84	11.76
91	75J	V75 V100	14.29 14.29	5	5 6	0	2.10	0. 0.	2.10	29.41 35.29
		V500	14.29	2	Ş	ŏ	.84	0.	.84	11.76
	3333		14.29	Ō	ō	Ŏ	0.	ů.	0.	0.
	\$115		14.29	0	0	0	0.	0.	0.	0.
	25K	V25	14.29	0	0	0	0.	0.	0.	0.
	50K	V50	14.29	3	3	0	1.26	0.	1.26	33.33
	75K	V75	14.29	5	2	0	.84	0.	. 84	22.22
	500K	V100 V500	14.29 14.29	1 3	1 3	0	.42 1.26	0. 0.	.42	11.11 33.33
101	????	¥300	14.29	0	Õ	ŏ	0.	0.	0.	0.
	1111		14.29	Ŏ	ŏ	ŏ	o.	o.	0.	o.
103	25L	V25	14.29	2	2	0	. 84	0.	.84	28.57
104	50L	V50	14.29	5	2	0	. 84	0.	.84	28.57
105	75L	V75	14.29	1	1	Ü	.42	0.	. 42	14.29
106	100L 500L	V100 V500	14.29	9	5 0	0	0. .84	0. 0.	0. .84	0. 28.57
108	7777	1300	14.29	0	ō	ŏ	0.	0.	0.	0.
	5555		14.29	0	ō	Ö	0.	0.	0.	0.
	25M	V25	14.29	1	1	0	.42	0.	.42	50.00
	50M	V50	14.29	0	0	0	0.	0.	0.	
113	75M	V75 V100	14.29	0	0	0	0.	0.	0.	0.
	5000		14.29	i	1	O U	0. .42	0. 0.	0. .42	0. 50.00
	7777	7500	14.29	ò	ò	ŏ	υ.	ŏ.	0.	0.
116	1111		14.29	Û	0	0	O.	0.	ō.	o.
117	2511	V25	14.29	0	0	0	0.	0.	0.	0.
118	50N	V50	14.29	0	0	0	0.	0.	0.	0.
120	75H 100H	V75	14.29	0	0	0	0.	0.	0.	0.
121	500H	V500	14.29	1	0 1	0	0. .42	0. 0.	0.	0. 100.00
	7777	1000	14.29	ò	ò	ŏ	0.	o.	0.	0.
123	1555		14.29	Ō	Ö	Ö	0.	0.	Ŏ.	0.
124	250	V25	14.29	0	0	0	0.	0.	0.	0.
125	500	V50	14.29	0	0	0	0.	0.	0.	0.
126 127	750 1000	V75	14.29	Û	0	0	0.	0.	0.	0.
128	5000	V100	14.29 14.29	0	0	0	0.	0.	0.	100.00
1.29	2555	4200	14.29	0	1 0	Ü	.42 0.	0.	0.42	0.00
1 30	1111		14.29	ò	Ŏ	ŏ	u.	o.	0.	Ŏ.
131	C.54	V25	14.29	0	0	0	0.	0.	0.	0.
132 133	S (IP	V50	14.29	0	0	0	0.	0.	0.	0.
1.4	75P 100P	V75	14.29	0	0	0	ø.	0.	0.	0.
	500P	V100	14.29	0	0	0	0.	0.	0.	0.
•		1200	14.29 14.29	0	0	0	0. 0.	0.	0. 0.	0. 0.
1 7	1111		A A Sub-		×	.		Ž.	Ž.	•



EXHIBIT D-10. LOGIC TREE FOR ANALYZING FREQUENCY OF SIDE CRACKS IN LONGITUDINAL AND VERTICAL MATRIX

••••	•••••	•••••	*****	•••••	•••••	*****	*****	•••••	*****
HODE NAM			HLL						
		MEIGHT	k	0	-N/D-		25	PT	pp
1 LEVO		100.00	159	436	0	100.00	0.	100.00	100.00
	ED61	25.00	101	101	Û	63.52	0.	63.52	63.52
	STER	25.00	51	51	0	32.08	0.	32.08	32.08
4 ????		25.00	0	0	0	0.	0.	0.	0.
5 \$\$\$\$	er en a lo	25.00	7	7	Ü	4.40	0.	4.40	4.40
	CP10	10.00	35	35	0	22.01	0.	22.01	34.65
4	CP20	10.00	20	20	0	12.58	0.	12.58 9.43	19.80
	CP30	10.00	15	15	0	9.43	0.	5.03	14.85 7.92
	CP40 CP50	10.00	8	8 9	0	5.03 5.66	0. 0.	5.66	8.91
	CP60	10.00	7	7	0	4.40	0.	4.40	6.93
	CP70	10.00	í	í	0	.63	0.	.63	.99
	CP99	10.00	i	i	ŏ	.63	o.	.63	99
14 ????	OF 22	10.00	Ů	Ô	0	0.	0.	0.	0.
15 \$888		10.00	Š	5	ŏ	3.14	0.	3.14	4.95
	CP10	10.00	19	19	ŏ	11.95	0.	11.95	37.25
	CP20	10.00	, á	é	ŏ	5.66	ŏ.	5.66	17.65
	CP30	10.00	6	6	ŏ	3.77	ő.	3.77	11.76
	CP40	10.00	5	5	ŏ	3.14	o.	3.14	9.80
	CP50	10.00	ž	ž	ŏ	1.26	ŏ.	1.26	3.92
	CP60	10.00	1	ī	ŏ	.63	ő.	.63	1.96
	CP70	10.00	i	i	ŏ	.63	o.	.63	1.96
	CP99	10.00	ō	ō	ŏ	0.	ő.	0.	0.
24 ????	0,	10.00	ŏ	ŏ	ŏ	ő.	o.	o.	Ŏ.
25 \$\$\$\$		10.00	8	Š	Ŏ	5.03	o.	5.03	15.69
	V25	14.29	3	3	Ŏ	1.89	0.	1.89	8.57
	V50	14.29	9	ğ	Ď	5.66	ú.	5.66	25.71
	V75	14.29	6	6	Ŏ	3.77	0.	3.77	17.14
29 100A		14.29	9	9	ů	5.66	Ŏ.	5.66	25.71
	V500	14.29	6	6	Ö	3.77	0.	3.77	17.14
31 ????		14.29	Ö	Ō	Ü	0.	ó.	0.	0.
32 \$\$1\$		14.29	ě	٤	Ō	1.26	o.	1.26	5.71
	V25	14.29	4	4	Ò	2.52	0.	2.52	20.00
	V50	14.29	3	3	0	1.89	0.	1.89	15.00
35 75B 1	V75	14.29	3	3	0	1.89	0.	1.89	15.00
36 100B	V100	14.29	2	2	0	1.26	Û.	1.26	10.00
	V500	14.29	8	8	0	5.03	Û.	5.03	40.00
38 ????		14.29	0	0	0	0.	0.	0.	0.
39 1111		14.29	O	0	0	0.	0.	0.	0.
	V25	14.29	5	3	O	1.26	0.	1.26	13.33
	V50	14.29	3	3	0	1.89	0.	1.89	20.00
	V75	14.29	3	3	0	1.89	0.	1.89	20.00
	V100	14.29	3	3	0	1.89	0.	1.89	20.00
	V500	14.29	4	4	0	2.52	0.	2.52	26.67
45 ????		14.29	0	0	0	0.	0.	0.	0.
46 \$555	455	14.29	0	0	0	0.	0.	0.	0.
	V25	14.29	1	1	0	.63	0.	.63	12.50
	V50	14.29	1	1	0	.63	0.	.63 1.26	12.50 25.00
	V75	14.29	5 5 5	5 5 5	Ŏ	1.26 1.26	0.	1.26	25.00
	V100	14.29	2	3	ŏ	1.26	0. 0.	1.26	25.00 25.00
52 7777	V500	14.29	0	Õ	ŏ	0.	0.	0.	0.
53 1111		14.29	ŏ	ŏ	ŏ	ů.	0.	o.	o.
-	V25	14.29	ŏ	ŏ	ŏ	ű.	ŏ.	o.	o.
	V50	14.29	ŏ	ŏ	ŏ	o.	0.	0.	0.
_	V75	14.29	ŏ	ŏ	ŏ	o.	0.	0.	0.
57 100E 1	V100	14.29	3	3	ŏ	1.89	o.	1.89	33.33
58 500E 1	V500	14.29	3	3 6 0	ŏ	3.77	o.	3.77	66.67
23 3333		14.29	ő	ñ	ŏ	0.	o.	0.	0.
\$355		14.29	ŏ	ŏ	ŏ	ŏ.	o.	o.	ó.
61 25F V	/25	14.29	0	Ŏ	ŏ	ŏ.	ŏ.	ŏ.	0.
62 50F \	/50	14.29	2	ž	ŏ	1.26	o.	1.26	28.57
63 75F \	/75	14.29	5	2	ŏ	1.26	ŏ.	1.26	28.57
64 100F V	/100	14.29	2	2 2 2 0	ŏ	1.26	ŏ.	1.26	28.57
65 900F V	/500	14.29	0	0	Ö	0.	o.	0.	0.
66 7777		14.29	Ò	Ō	Ŏ	0.	0.	Ŏ.	ŏ.
67 \$3\$\$		14.29	1	1	0	63	0	43	14 30



EXHIBIT D-10. (Continued)

€8	256	Va5	14.29	0	0	0	0.	0.	0.	0.
69	506	V50	14.29	0	0	0	0.	0.	0.	0.
70	756	V75	14.29	0	0	0	0.	0.	0.	0.
7'	1 0 0 5	V100	14.29	0	0	0	0.	0.	0.	0.
72	5006	V500	14.29	1	1	0	.63	0.	,.63	100.00
73	2777		14.29	0	0	0	0.	0.	0.	0.
74	4144	t tree	14.29	0	0	0	0.	0.	0.	0.
75	25H	V25	14.29 14.29	0	0	Û	0. 0.	0.	0.	0. 0.
76 77	50H 75H	V50 V75	14.29 14.29	0	0	0	v.	0. 0.	0.	0.
. 78	100H	V100	14.29	1	1	Ö	.63	o.	0. .63	
79	500H	V500	14.29	ò	ó	ő	0.	o.	0.	0.
80	????	1000	14.29	ŏ	ŏ	ŏ	o.	o.	ŏ.	ŏ.
81	1111		14.29	ŏ	ŏ	ŏ	Õ.	o.	ŏ.	o.
82	251	V25	14.29	š	š	ŏ	1.89	ů.	1.89	15.79
83	501	V50	14.29	4	4	ŏ	2.52	o.	2.52	21.05
84	751	V75	14.29	5	5	Ó	3.14	o.	3.14	26.32
85	1001	V100	14.29	2	2	0	1.26	0.	1.26	10.53
86	5001	V500	14.29	5	5	0	3.14	0.	3.14	26.32
87	7777		14.29	Û	0	0	0.	0.	0.	0.
83	2444		14.29	0	0	0	0.	0.	0.	0.
89	251	V25	14.29	1	1	0	.63	0.	.63	11.11
90	50J	V50	14.29	0	0	0	0.	0.	0.	0.
91	75J	V75	14.29	4	4	0	2.52	0.	2.52	44.44
92	100J	V100	14.29	3	3	Q	1.89	0.	1.89	33.33
93	500J	V500	14.29	1	1	0	.63	0.	.63	11.11
94	????		14.29	0	0	0	0.	0.	0.	0.
95	3.5.5.5		14.29	0	0	0	0.	0.	0.	0.
96	25K	V25	14.29	0	0	0	0.	0.	0.	0.
97	50K	V50	14.29	5	5	0	1.26	0.	1.26	33.33
98	75K	V75	14.29	5	2	0	1.26	0.	1.26	33.33
99	100K	V100	14,29 14,29	1	1	0	.63	0.	.63 .63	16.67 16.67
100	500K	V500	14.29	1 0	1 0	0	.63 0.	0. 0.	0.	0.
102	\$111		14.29	0	ŏ	0	0.	0.	0.	0.
103	25L	V25	14.29	1	ĭ	ŏ	.63	ŏ.	.63	20.00
104	50L	V50	14.29	٤	ż	ŏ	1.26	ŏ.	1.26	40.00
105	75L	V75	14.29	ō	ō	ŏ	0.	o.	0.	0.
106	100L	V100	14.29	Õ	ŏ	ŏ	o.	ŏ.	ŏ.	o.
107	500L	V500	14.29	è	ž	ŏ	1.26	ō.	1.26	40.00
108	????		14.29	0	Õ	Ō	0.	0.	0.	0.
109	1111		14.29	Ó	Ô	Û	0.	0.	0.	0.
110	25M	V25	14.29	1	1	0	.63	0.	. 63	50.00
111	50M	V50	14.29	0	0	0	0.	0.	0.	0.
112	75M	Y75	14.29	0	0	0	0.	0.	0.	0.
113	1001	V100	14.29	0	0	Ü	0.	0.	0.	0.
114	50011	V500	14.29	1	1	0	.63	0.	.63	50.00
	7???		14.29	0	0	0	0.	0.	0.	0.
116			14.29	0	0	0	0.	0.	0.	0.
	25N	V25	14.29	0	0	0	0.	0.	0.	0.
118	50N	V50	14.29	0	0	0	0	0.	0.	0.
	75N	V75	14.29	0	0	0	0.	0.	0.	0.
120 121	100M		14.29 14.29	ĭ	1	0	0. .63	0.	0. .63	0. 100. 0 0
122	7777	A-200	14.29	ů	Ó	Ö	0.	0. 0.	0.	0.
123	\$\$\$\$		14.29	ŏ	ŏ	ō	U.	o.	o.	o.
124	250	V25	14.29	ŏ	ŏ	ŏ	0.	o.	ŏ.	Ŏ.
	500	V50	14.29	ŏ	Ŏ	ŏ	v.	ŏ.	ŏ.	ő.
	750	V75	14.29	ŏ	ŏ	ŏ	o.	ŏ.	ŏ.	o.
127	1000		14.29	ŏ	Ŏ	Ŏ	0.	0.	ō.	Ŏ.
	5000		14.29	ĭ	ĭ	Ö	. 63	Õ.	.63	100.00
	????		14.29	ö	Ö	ŏ	0.	Ŏ.	0.	0.
130	1515		14.29	Ŏ	Ö	Ŏ	Ŏ.	0.	Ö.	Ŏ.
131	25P	V25	14.29	Ö	Ô	Ó	0.	0.	0.	0.
132	50P	V50	14.29	0	0	0	O.	0.	0.	0.
133	75P	V75	14.29	0	0	0	0.	0.	0.	0.
134	100P	V100	14.29	0	0	0	0.	0.	0.	0.
3%	500P	V500	14.29	0	0	Ú	0.	0.	0.	0.
136	3333		14.29	0	0	0	0.	0.	0.	0.
100	1111		14.29	0	0	Q	0.	0.	0.	0.

EXHIBIT D-11. LOGIC TREE FOR ANALYZING FREQUENCY OF SIDE HOLES IN LONGITUDINAL AND VERTICAL MATRIX

•••••	•••••	*****	•••••	****	•••••	*****	•••••	•••••
HODE HAME?		FILL	_	41 .64	e. 4	• •	r. -	55
	MEIGHT	•		-41/0-	51	52	PT	PP
1 LEVO PAS	100.00	88	347	0	100.00	0.		100.00
2 800 8001	25.00	62	62	0	70.45	0.	70.45	70.45
3 STRN STEP	25.00	21	21	0	23.86	0.	23.86	23.86
4 7777	25.00	0	0	0	0.	0.	0.	0.
5 1111	25.00	5	5	0	5.68	0.	5.68	5.68
6 B10 CP10 7 B20 CP20	10.00	24	24	0	27.27	0.	27.27	38.71
	10.00	8	8	Û	9.09	0.	9.09	12.90
8 B30 CF30 9 B40 CP40	10.00	13 6	13 6	0	14.77 6.82	0. 0.	14.77 6.82	20.97 9.68
10 850 CP50	10.00	4	4	Ô	4.55	0.	4.55	6.45
11 860 CP60	10.00	3	3	0	3.41	0.	3.41	4.84
12 870 CP70	10.00	ž	Š	ŏ	2.27	o.	2.27	3.23
13 899 CP99	10.00	Õ	ō	ŏ	0.	ŏ.	0.	0.
14 ????	10.00	ŭ	ŏ	ŏ	ů.	Ŏ.	0.	ŭ.
15 1111	10.00	غ	ě	Ŏ	2.27	o.	2.27	3.23
16 310 CP10	10.00	6	6	ŏ	6.82	o.	6.82	28.57
17 S20 CP20	10.00	9	9	Ŏ	10.23	0.	10.23	42.86
18 \$30 CP30	10.00	3	3	ŏ	3.41	o.	3.41	14.29
19 \$40 CP40	10.00	3	3	Ö	3.41	o.	3.41	14.29
20 \$50 CP50	10.00	Ü	0	Ō	0.	0.	0.	0.
21 \$60 CP60	10.00	0	0	Ō	0.	Ô.	o.	0.
22 570 CP70	10.00	Û	0	0	0.	0.	0.	0.
23 S99 CP99	10.00	0	0	0	0.	0.	0.	0.
24 ????	10.00	0	0	0	0.	0.	0.	0.
25 1111	10.00	0	0	Ú	0.	0.	0.	0.
26 25A V25	14.29	4	4	0	4.55	0.	4.55	16.67
27 50A V50	14.29	5	5	0	5.68	0.	5.68	20.83
28 75A Y75	14.29	5	5	0	5.68	0.	5.68	20.83
29 100A V100	14.29	5	5	0	5.68	0.	5.68	20.83
30 500A V500	14.29	3	3	0	3.41	0.	3.41	12.50
31 ????	14.29	0	0	0	0.	0.	0.	0.
32 \$\$\$\$	14.29	2	2	0	2.27	0.	2.27	8.33
33 25B V25	14.29	2	2	0	2.27	0.	2.27	25.00
34 50B V50	14.29	3	3	0	3.41	0.	3.41	37.50
35 75B V75	14.29	1	1	0	1.14	0.	1.14	12.50
36 100F V100	14.29	2	2	0	2.27	0.	2.27	25.00
37 500E V500	14.29	0	0	Q	0.	0.	0.	0.
38 ????	14.29	0	0	0	0.	0.	0.	0.
39 3155	14.29	0	0	0	0.	0.	0.	0.
40 25C V25	14.29	0	0	0	0.	0.	0.	0.
41 500 V50	14.29	3	3	0	3.41	0.	3.41	23.08
42 750 V75	14.29	3	3	0	3.41	0.	3.41	23.08
43 100C V100	14.29	4	4	0	4.55	0.	4.55	30.77
44 500C V500	14.29	3	3	0	3.41	0.	3.41	23.08
45 ????	14.29	0	0	0	O.	0.	0.	0.
46 \$118	14.29	0	0	Û	0.	0.	0.	0.
47 25D Y25	14.29	1	1	0	114	0.	1.14	16.67
48 50D V50	14.29	1	1	0	1.14	0.	1.14	16.67
49 75D V75 50 100D V100	14.29 14.29	2	2	0	2.27	0.	2.27	33.33
		2	0	0	0.	0.	0.	0.
51 500D V500 52 7???	14.29	Õ	5	0	2.27	0.	2.27	33.33
53 \$155	14.29	0	ŏ	0	0.	0.	0.	0.
54 25E V25	14.29	ő	Ö	0	0. 0.	0.	0.	0.
55 50E V50	14.29	ě	Š		2.27	0.	0. 2.27	0.
56 75E V75	14.29	1	1	0	1.14	0. 0.	1.14	50.00 25.00
57 100E V100	14.29	i	i	ő	1.14	0.	1.14	25.00 25.00
58 500E V500	14.29	ò	Ô	ő	ů.	.0.	0.	0.
59 ????	14.29	ŏ	Ŏ	ő	0.	0.	0.	0.
60 1111	14.29	ŏ	ŏ	ŏ	0.	0.	0.	0.
61 25F Y25	14.29	ŏ	ŏ	ŏ	ŏ.	ŏ.	ŏ.	ñ.
62 50F V50	14.29	ĭ	ĭ	ŏ	1.14	ŏ.	1.14	33.33
63 75F V75	14.29	ò	ö	ŏ	0.	ŏ.	0.	0.
64 100F V100	14.29	ĭ	ĭ	ŏ	1.14	Ŏ.	1.14	33.33
65 500F Y500	14.29	Ö	ō	ŏ	0.	ŏ.	0.	0.
66 7777	14.29	ŏ	Ŏ	ŏ	O.	0.	Ŏ.	o.

EXHIBIT D-11. (Continued)

47	1111		14.29	1	1	O	1.14	0.	1.14	33.33
				-						
	256	V25	14.29	0	0	0	0.	0.	0.	0.
	5.06	V50	14.29	0	0	Ú	G.	O.	0.	0.
70	756	V75	14.29	0	0	Û	U.	0.	0.	0.
71		V100	14.29	1	1	Ü	1.14	0.	1.14	50.00
	5006			i		-				
		ADOD	14.29	-	1	0	1.14	0.	1.14	50.00
73	25.55		14.29	Û	0	Ű	0.	0.	0.	0.
74	1111		14.29	Û	0	0	Û.	0.	0.	0.
	25H	V25	14.29	Û	Ó	Ó	0.	0.	0.	0.
						-				
	50H	V50	14.29	0	0	0	0.	0.	0.	0.
77	75H	V75	14.29	0	0	0	0.	Q.	0.	0.
78	1 0 0H	V100	14.29	Û	0	Û	0.	0.	0.	0.
79	500H	V500	14.29	Ü	Ö	Ô	0.	0.	0.	0.
	7777	4 20 V		-		-				
			14.29	0	0	0	O.	0.	0.	0.
- 81	1.1.1.1		14.29	0	0	0	Û.	0.	0.	0.
82	251	V25	14.29	0	0	0	0.	0.	0.	0.
83	501	V50	14.29	3	3	0	3.41	0.	3.41	50.00
	751				3					
		V75	14.29	2	2	0	2.27	0.	2.27	33.33
	1001	V100	14.29	0	0	Û	0.	0.	0.	0.
- 86	5001	V500	14.29	1	1	0	1.14	0.	1.14	16.67
27	????		14.29	0	0	0	0.	0.	0.	0.
	5111		14.29	ŏ	ŏ					
					U	0	0.	0.	0.	0.
	25J	V25	14.29	2	5	0	2.27	0.	2.27	22.22
90	50J	V50	14.29	5	2	0	2.27	0.	2.27	22.22
	75J	V75	14.29	1	1	0	1.14	0.	1.14	11.11
			14.29	3	3	-				
						0	3.41	0.	3.41	33.33
	500J	V500	14.29	1	1	0	1.14	0.	1.14	11.11
94	7777		14.29	0	0	0	0.	0.	0.	0.
95	1111		14.29	0	Ó	0	0.	0.	0.	O.
	25K	V25		ŏ	Ŏ	-				
						0	0.	0.	0.	0.
	5.0K	V50	14.29	1	1	0	1.14	0.	1.14	33.33
98	75K	V75	14.29	0	0	0	0.	0.	0.	0.
99	100K	V100	14.29	0	0	0	0.	0.	0.	0.
100		V500	14.29		ž	ŏ	2.27			
		4200		٤	٠,	_		0.	2.27	66.67
101	3333		14.29	0	0	0	o.	0.	0.	0.
102	1111		14.29	0	0	0	0.	0.	0.	0.
103	25L	V25	14.29	1	1	0	1.14	0.	1.14	33.33
104	50L	V50	14.29	1	ī	ŏ	1.14	ŏ.	1.14	33.33
				_		_				
105	75L	V75	14.29	1	1	0	1.14	0.	1.14	33.33
106	100L	V100	14.29	Û	0	0	0.	O.	0.	0.
107	500L	V500	14.29	0	0	0	u.	0.	0.	0.
108	7777		14.29	Ŏ	Ŏ	Ö	0.	o.	ŏ.	Ŏ.
				-				_		
	1111		14.29	0	0	0	0.	0.	0.	0.
110	25M	V25	14.29	0	0	0	Û.	0.	0.	0.
111	5 0M	V50	14.29	0	0	0	0.	0.	0.	0.
	75M	V75	14.29	0	Ō	Ó	0.	o.	0.	0.
			14.29	ŏ	ŏ.	-				
	10011			•	-	0	0.	0.	0.	0.
	500M	Y500	14.29	0	0	0	0.	0.	0.	0.
115	????		14.29	0	0	0	0.	0.	0.	0.
116	3355		14.29	0	0	0	0.	0.	0.	0.
	N25	V25	14.29	0	ŏ	ŏ	0.,	-	ō.	o.
								0.		
	50N	V50	14.29	0	0	Ü	0.	0.	0.	0.
119	75H	V75	14.29	0	0	0	0.	0.	0.	0.
120	100N	V100	14.29	0	0	0	0.	0.	0.	0.
	500H		14.29	Ò	Ó	ŏ	0.	o.	ŏ.	Ŏ.
100		¥ 300								
	????		14.29	0	0	0	0.	0.	0.	0.
	1111		14.29	0	0	0	0.	0.	0.	0.
124	250	V25	14.29	0	0	0	0.	0.	0.	0.
	500	V50	14.29	Ŏ	Ŏ	ŏ	0.	o.	0.	O.
	750	V75	14.29	ŏ	ŏ					
						0	0.	0.	0.	0.
	1000		14.29	0	Ö	0	0.	0.	0.	0.
128	5000	V500	14.29	0	0	0	0.	.0.	0.	0.
	????		14.23	0	0	Ö	U.	0.	0.	0.
	5115		14.29	ŏ	ŏ	Ŏ	o.	ŏ.	ŏ.	
			14 30							0.
	25P	V25	14.29	0	0	0	0.	0.	0.	0.
	50P	V50	14.29	0	0	U	Ű.	0.	0.	0.
133	75P	V75	14.29	Ű	Ü	0	u.	0.	0.	0.
	100P		14.29	0	Ö	Ŏ	Q.	0.	0.	0.
	500P		14.29	Õ	ŏ			_		
		4.000		_	-	Ŏ	o.	0.	0.	0.
	7777		14.29	O	0	0	0.	0.	0.	0.



EXHIBIT D-12. LOGIC TREE FOR ANALYZING FREQUENCY OF SIDE WASTED THROUGH DAMAGE IN LONGITUDINAL AND VERTICAL MATRIX

**********	•••••	•••••	•••••	••••	•••••	•••••	•••••	•••••
HODE NAME?		ALL					F. T	C.C.
NO. HAME EVENT		W 5		-H\\D-	51	35		
1 LEVO PAS 2 BOW BOW1	25.00	4	22 4	0	10.00 80.00	0. 0.	80.00	100.00 80.00
3 STRN STER	25.00	0	0	0	0.	0.	0.	0.
4 ????	25.00	ŏ	Ö	Ü	v.	0.	0.	0.
5 \$111	25.00	í	ĭ	Ö	20.00	ő.	20.00	20.00
6 B10 CP10	10.00	ج	ė	ŏ	40.00	o.	40.00	50.00
.7 \$20 CP20	10.00	0	Õ	ŭ	0.	ŭ.	0.	0.
8 B30 CP30	10.00	Ö	ò	Ü	0.	ő.	o.	0.
9 B40 CF40	10.00	0	Û	0	0.	0.	0.	0.
10 B50 CP50	10.00	ح	2	0	40.00	0.	40.00	50.00
11 B60 CP60	10.00	0	Û	0	0.	0.	0.	0.
12 B70 CP70	10.00	Û	0	0	0.	0.	0.	0.
13 199 CP99	10.00	0	Û	0	0.	0.	0.	0.
14 ????	10.00	0	0	0	0.	0.	0.	0.
15 4444	10.00	Û	0	0	0.	0.	0.	0.
16 \$10 CP10	10.00	0	0	0	0.	0.	0.	0.
17 \$20 CP20	10.00	0	0	0	0.	0.	0.	0.
18 S30 CP30	10.00	0	0	ű	0.	0.	0.	0.
19 340 CP40	10.00	0	0	0	0.	0.	0.	0.
20 \$50 CP50 21 \$60 CP60	10.00	0	0	0	0.	0.	υ.	0.
21 \$60 CP60 22 \$70 CP70	10.00	Û	0	0	0.	0. 0.	0.	0. 0.
23 S99 CP99	10.00	0	Ů	Ŏ	0. 0.	0.	0. 0.	0.
24 ????	10.00	n	ŏ	Ö	0.	0.	0.	0.
25 1111	10.00	Ü	ŏ	ő	0.	o.	ŏ.	Ŏ.
26 25A V25	14.29	ŏ	ŏ	ŏ	U.	ŏ.	ŏ.	o.
27 50A V50	14.29	ĭ	ĭ	ŏ	20.00	ŏ.	20.00	50.00
28 75A V75	14.29	ī	ī	Ŏ	20.00	Õ.	20.00	50.00
29 100A V100	14.29	Ö	Ō	Ü	Ű.	O.	0.	0.
30 500A V500	14.29	0	0	0	0.	0.	0.	0.
31 ????	14.29	0	0	0	0.	0.	О.	0.
33 3444	14.29	0	0	0	0.	0.	0.	0.
33 25B V25	14.29	0	0	0	0.	0.	0.	0.
34 50E V50	14.29	0	0	0	9.	0.	0.	٥.
35 758 Y75	14.29	0	0	0	Ģ.	0.	٥.	0.
36 100E V100	14.29	Ġ.	0	0	0.	0.	0.	0.
37 5008 V500	14.29	Ú	0	0	0.	o.	0.	0.
38 ???? 39 \$1\$1	14.29	0	0	0	0.	0.	0.	0.
40 25C V25	14.29	0	0	0 U	0.	0.	0.	0.
41 500 V50	14.29	Û	0	Ö	0. 0.	0. 0.	0. 0.	0. 0.
42 750 V75	14.29	ŏ	Ö	ŏ	0.	o.	0.	ŏ.
13 100C V100	14.29	ŏ	ŏ	ŏ	ŏ.	ŏ.	ŏ.	ŏ.
44 500C V500	14.29	ŏ	ŏ	ŏ	ŏ.	ŏ.	Ŏ.	Ŏ.
45 ????	14.29	Ò	ŏ	Ŏ	ů.	o.	Ŏ.	ō.
46 5111	14.29	0	0	0	o.	0.	0.	0.
47 25D V25	14.29	0	0	0	0.	0.	0.	0.
48 50D V50	14.29	0	0	0	0.	0.	0.	0.
49 75D V75	14.29	0	0	0	O.	0.	0.	0.
50 100D V100	14.29	0	0	0	ø.	0.	0.	ο.
51 5000 V500	14.29	0	0	0	0.	0.	0.	0.
52 ????	14.29	0	0	0	v.	0.	0.	0.
53 1418	14.29	0	0	0	0.	0.	0.	0.
54 25E V25	14.29	0	0	0	0.	0.	0.	0.
55 50E V50	14.29	2	2	0	40.00	0.	40.00	100.00
56 75E V75	14.29	0	0	0	Ű.	0.	0.	0.
57 100E V100 58 500E V500	14.29	0	0	0	0. 0.	0.	0.	0. 0.
59 ????	14.29	0	Ö	Ů	0.	0. 0.	0. 0.	0.
60 \$\$\$\$	14.29	Ü	0	Ŏ	0.	0.	0.	o.
61 25F V25	14.29	Ů	ŏ	Ô	0.	Ö.	0.	0.
62 50F V50	14.29	Ö	ŏ	ŏ	o.	o.	o.	Ŏ.
63 75F V75	14.29	ŏ	ŏ	ŏ	o.	ŏ.	ŭ.	o.
64 100F V100	14.29	ŏ	ŏ	ő	v.	ŏ.	ŏ.	ő.
65 500F V500	14.29	Ŏ	ŏ	Ŏ	0.	o.	ŏ.	0.
66 ????	14.29	Ô	0	Ö	0.	0.	o.	0.

EXHIBIT D-12. (Continued)

67	1111		14.29	0	0	0	0.	O.	0.	0.
68	256	V25	14.29	ŏ	Ŏ	ő	ŏ.	ŏ.	Ŏ.	õ.
69	506	V50	14.29	ŭ	Ŏ	Ŏ	ŏ.	ő.	ŏ.	Ŏ.
70	756	V75	14.29	ő	ŏ	ů	ő.	ű.	ů.	ű.
71	1006	V100	14.29	ŏ	Ŏ	ŏ	o.	ö.	ő.	o.
		V500							0.	_
72	5006	ABOOG	14.29	0	0	0	0.	0.		0.
73	7777		14.29	0	0	Ð	0.	0.	0.	0.
74	1111		14.29	0	0	0	O.	0.	0.	0.
75	25H	V25	14.29	0	0	0	0.	0.	0.	0.
76	50H	V50	14.29	0	0	0	O.	0.	0.	0.
. 77	75H	V75	14.29	9	0	O	O.	0.	0.	0.
78	1 0 0H	V100	14.29	0	0	Û	ú.	0.	0.	Û.
79	500H	V500	14.29	0	0	0	0.	0.	0.	0.
80	????		14.29	0	0	0	0.	0.	0.	0.
81	1111		14.29	0	0	0	0.	0.	0.	0.
82	251	V25	14.29	0	Ó	0	0.	0.	0.	0.
83	501	V50	14.29	Ô	Ò	Ö	u.	0.	0.	0.
84	751	V75	14.29	ŏ	ŏ	ŏ	õ.	o.	0.	ű.
85	1001	V100	14.29	ŏ	ŏ	ŏ	ŭ.	ŏ.	ŏ.	ŏ.
86	5001	V500	14.29	ŏ	ŏ	ŏ	ű.	õ.	0.	ů.
87	????	V 200	14.29	ŏ	ŏ	ŏ	o.	ŏ.	ŏ.	0.
88	1111									
		1155		0	0	v	0.	0.	0.	0.
89	253	V25	14.29	0	Û	0	0.	0.	0.	0.
90	507	V50	14.29	0	0	Ü	0.	0.	0.	0.
91	75J	V75	14.29	0	0	0	0.	Q.	0.	0.
92	1000	V100	14.29	0	0	0	0.	0.	0.	0.
93	500J	V500	14.29	0	0	0	0.	0.	0.	0.
94	3333		14.29	0	0	0	0.	0.	0.	0.
95	1111		14.29	0	0	0	0.	0.	0.	0.
96	251.	V25	14.29	ŋ	0	0	0.	0.	0.	0.
97	50K	V50	14.29	0	0	0	O.	0.	0.	0.
98	75K	V75	14.29	Ô	0	0	o.	0.	0.	0.
99	100K	V100	14.29	Ö	Ó	Ò	o.	o.	ō.	o.
100	500K	V500	14.29	Ö	Ó	Ö	0.	o.	o.	ö.
101	7777		14.29	ŏ	ŏ	ŏ	Õ.	Ŏ.	ŏ.	ŏ.
102	1111		14.29	ő	Ö	ŏ	ŏ.	o.	ő.	ŏ.
103	25L	V25	14.29	ő	Ö	Ŏ	o.			o.
								0.	0.	
104	SOL	V50	14.29	0	0	0	0.	0.	0.	0.
105	75L	V7 5	14.29	0	0	0	0.	0.	0.	0.
106	100L	V100	14.29	0	0	0	0.	o.	0.	0.
107	500L	V500	14.29	0	0	0	0.	0.	0.	0.
108	????		14.29	0	0	0	v.	0.	0.	0.
109	1111		14.29	0	0	0	Q.	0.	0.	0.
110	25M	V25	14.29	0	0	0	0.	0.	0.	0.
111	SOM	V50	14.29	0	0	0	0.	0.	0.	0.
112	75M	V75	14.29	0	0	0	0.	0.	0.	0.
113	1 0 0M	V100	14.29	0	0	0	Ű.	0.	0.	0.
		V500	14.29	0	Ó	0	0.	0.	0.	0.
	????		14.29	Ŏ	Ö	0	o.	0.	0.	0.
116	3335		14.29	ŏ	Ŏ	Ŏ	Ú.	ŏ.	Ŏ.	o.
117	25N	V25	14.29	ŏ	ŏ	ŏ	ů.	õ.	ő.	ő.
	5 OH	V50	14.29	ŏ	ŏ	ŏ	ů.	ŏ.	o.	ő.
114	75N	V75	14.29	ŏ	ŏ	Ŏ	o.	ŏ.	0.	o.
		V100	14.29	Ö	Ö	Ö	v.	0.	0.	0.
		V500	14.29		ŏ					
	500N	V500		0		0	0.	0.	0.	0.
	????		14.29	0	0	0	U.	0.	0.	0.
123	1111	1100	14.29	0	0	0	0.	0.	0.	0.
	250	V25	14.29	0	0	0	o.	0.	0.	9.
125		V50	14.29	0	0	0	ø.	0.	0.	0.
126		V75	14.29	0	0	0	0.	0.	0.	o.
		V100	14.29	0	0	0	0.	0.	0.	0.
123	5000	V500	14.29	0	0	0	υ.	0.	0.	0.
129	7777		14.29	0	0	0	0.	О.	0.	0.
130	1111		14.29	0	0	0	0.	0.	0.	0.
	25P	V25	14.29	Ü	Ó	Ö	0.	0.	O.	o.
	50P	V50	14.29	ŏ	Ŏ	ŏ	v.	o.	o.	o.
133	75P	V75	14.29	ŭ	ŏ	ŏ	v.	Ŏ.	ŏ.	ŏ.
		V100	14.29	ŏ	ŏ	ŭ	0.	0.	ŏ.	ŏ.
	SUOP	V500	14.29	ŏ	ŏ	ŏ	o.	Ŏ.	ŏ.	ŏ.
	7777		14.29	ŏ	ŏ	ŭ	υ.	ŏ.	o.	o.
	3555		14.29	ŏ	ŏ	ŏ	0.	o.	o.	o.
				~	~		~ .	~ .	~.	

D-29
EXHIBIT D-13. LOGIC TREE FOR ANALYZING CRACK LENGTH

HODE HAME?	•••••	fill	• • • •	•••••	******	•••••	•••••	*****
	METEMT			-11/0-	81	52	PT	PP
NO. HOME EVERT			289	0	100.00	0.	100.00	100.00
1 LEVO CRAR 2 PAS PAS	7.14		159	0	36.47	0.	36.47	36.47
3 PAB PAB	7.14	57	57	Õ	13.07	0.	13.07	13.07
4 PAI PAI	7.14	17	17	0	3.90	0.	3.90	3.90
5 PAE PAE	7.14	49	49	Ů	11.24	0.	11.24	11.24
6 KSB KSB	7.14	37 37	37	0	8.49	o.	8.49	8.49
' 7 KSD KSD	7.14	30	30	ŏ	6.88	o.	6.88	6.88
8 KES KES	7.14	33	33	Ü	7.57	o.	7.57	7.57
9 KED KED	7.14	22	22	ů	5.05	o.	5.05	5.05
10 KEB KEB	7.14	7	7	ŏ	1.61	ŏ.	1.61	1.61
11 UPC UPC	7.14	9	ė	Ŏ	2.06	Õ.	2.06	2.06
12 LWC LWC	7.14	ž	7	Ď	1.61	ő.	1.61	1.61
13 COM COM	7.14	Ś	5	ŏ	1.15	Ů.	1.15	1.15
14 ????	7.14		ŏ	ŏ	0.	· 0.	o.	0.
15 1111	7.14	420	4	Ō	.92	o.	.92	.92
16 LIH LLTI	14.29	70	70	ŏ	16.06	o.	16.06	44.03
17 LSA LLTS	14.29	15	15	Ŏ	3.44	0.	3.44	9.43
18 LGA LLTG	14.29	7	7	0	1.61	0.	1.61	4.40
19 L10A LL10	14.29	5	5	Ò	1.15	Ö.	1.15	3.14
20 L11A L610	14.29	10	10	Õ	2.29	ō.	2.29	6.29
21 ????	14.29	Ŏ	Ö	Ö	Ú.	o.	0.	0.
22 1111	14.29	52	52	Ö	11.93	0.	11.93	32.70
23 LIF LLTI	14.29	18	18	Ö	4.13	0.	4.13	31.58
24 L38 LLT3	14.29	2	5	Ŏ	. 46	0.	.46	3.51
25 L68 LLT6	14.29	ō	ō	Ŏ	0.	0.	0.	0.
26 L10B LL10	14.29	Ŏ	ō	Ŏ	Ö.	0.	o.	0.
27 L118 L610	14.29	ġ	9	Ŏ	2.06	o.	2.06	15.79
28 ????	14.29	Ô	Ō	Ô	0.	0.	0.	0.
29 1111	14.29	23	28	ŏ	6.42	0.	6.42	49.12
30 L10 LLT1	14.29	3	3	0	.69	0.	.69	17.65
31 L3C LLT3	14.29	1	1	Ō	.23	0.	.23	5.88
32 L60 LLT6	14.29	1	1	0	23	0.	.23	5.88
33 L100 LL10	14.29	0	0	0	0.	0.	0.	0.
34 L110 L610	14.29	2	2	0	.46	0.	.46	11.76
35 ????	14.29	0	0	0	0.	0.	0.	0.
36 1111	14.29	10	10	0	2.29	0.	2.29	58.82
37 L10 LLT1	14.29	. 15	15	0	3.44	0.	3.44	30.61
38 L3D LLT3	14.29	12	12	0	2.75	0.	2.75	24.49
39 L6D LLT6	14.29	7	7	0	1.61	0.	1.61	14.29
40 L100 LL10	14.29	2	2	0	.46	0.	.46	4.08
41 L11D L610	14.29	4	4	Ó	.92	0.	.92	8.16
42 ????	14.29	0	0	Ó	0.	0.	0.	0.
43 9111	14.29	9	9	0	2.06	0.	2.06	19.37
44 LIE LLTI	14.29	5	5	0	1.15	0.	1.15	13.51
45 L3E LLT3	14.29	8	8	0	1.83	0.	1.83	21.62
46 L6E LLT6	14.29	2	2	0	.46	0.	.46	5.41
47 L10E LL10	14.29	1	1	0	.23	0.	. 23	2.70
48 LITE LG10	14.29	9	9	0	2.06	0.	2.06	24.32
49 ????	14.29	0	0	0	0.	0.	0.	0.
50 \$111	14.29	12	12	0	2.75	0.	2.75	32.43
51 LIF LLTI	14.29	3	3	0	.69	0.	.69	10.00
52 L3F LLT3	14.29	3	3	0	.69	0.	.69	10.00
53 L6F LLT6	14.29	2	3	0	.46	0.	.46	6.67
54 L10F LL10	14.29	3	3	0	. 69	0.	.69	10.00
55 L11F LG10	14.29	3	3	0	.69	0.	. 69	10.00
56 ????	14.29	0	0	0	0.	0.	0.	0.
57 \$111	14.29	16	16	0	3.67	0.	3.67	53.33
58 L16 LLT1	14.29	12	12	0	2.75	0.	2.75	36.36
59 L36 LLT3	14.29	3		0	.69	Û.	.69	9.09
60 L66 LLT6	14.29	1	1	0	. 23	0.	.23	3.03
61 L106 LL10	14.29	4	4	0	.92	0.	. 92	12.12
62 L116 LG10	14.29	0	0	0	0.	0.	0.	0.
63 7777	14.29	0	0	0	0.	0.	0.	0.



D-30
EXHIBIT D-13. (Continued)

64 1111	14.29	13	13	0	2.98	0.	2.98 39.39
65 LIH LLTI	14.29	7	7	0	1.61	0.	1.61 31.82
66 L3H LLT3	14.29	3	3	Û	.69	0.	.69 13.64
67 LEH LLTG	14.29	4	4	0	.92	0.	.92 18.18
68 L10H LL10	14.29	1	1	0	.23	0.	.23 4.55
69 L11H L610	14.29	2	8	0	.46	0.	.46 9.09
70 ????	14.29	0	0	0	0.	0.	0. 0.
71 1111	14.29	5	5	Û	1.15	ů.	1.15 22.73
72 L11 LLT1	14.29	0	0	0	0.	0.	0. 0.
73 L31 LLT3	14.29	1	1	0	.23	0.	.23 14.29
74 L61 LLT6	14.29	0	O	0	Q.	0.	0. 0.
75 L101 LL10	14.29	1	1	Û	.23	0.	.23 14.29
76 L111 LG10	14.29	0	Û	0	0.	Ű.	0. 0.
77 ????	14.29	0	0	0	0.	0.	0. 0.
78 1111	14.29	5	5	0	1.15	0.	1.15 71.43
79 L1J LLT1	14.29	3	3	0	. 69	0.	.69 33.33
80 L3J LLT3	14.29	0	0	0	0.	0.	0. 0.
81 LGJ LLTG	14.29	1	1	0	.23	0.	.23 11.11
82 L10J LL10	14.29	0	Ò	O	υ.	0.	0. 0.
83 L11J L610	14.29	1	1	0	.23	0.	.23 11.11
84 ????	14.29	0	0	0	0.	O.	0. 0.
85 \$444	14.29	4	4	0	.92	0.	.92 44.44
86 LIK LLTI	14.29	1	1	0	.23	0.	.23 14.29
87 L3K LLT3	14.29	0	0	0	0.	0.	0. 0.
88 L6F LLT6	14.29	1	1	0	.23	0.	.23 14.29
89 L10K LL10	14.29	Û	0	0	0.	0.	0. 0.
90 L11K L610	14.29	1	1	0	.23	0.	.23 14.29
91 7777	14.29	0	0	0	u.	0.	0. 0.
92 1111	14.29	4	4	0	.92	0.	.92 57.14
93 LIL LLTI	14.29	0	0	0	o.	0.	0. 0.
94 L3L LLT3	14.29	0	0	0	0.	0.	0. 0.
95 LEL LLT6	14.29	1	1	0	.23	0.	.23 20.00
96 L10L LL10	14.29	0	0	0	0.	0.	0.
97 L11L L610	14.29	1	1	0	.23	0.	.23 20.00
98 ????	14.29	0	0	0	U.	0.	0. 0.
99 1111	14.29	3	3	0	.69	0.	.69 60.00



D-31

EXHIBIT D-14. LOGIC TREE FOR ANALYZING AREA OF HOLED DAMAGE

	•••••	•••••	• • • • • •	•••••	*****	•••••	• • • • • • • • • • • • • • • • • • • •
HODE HOME!	UE TOMT	ALL	()	#4 - F1	:1		PIPP
1 LEVO HOLE	100.00	347	1289		100.00	0.	100.00 100.00
2 PAS TO:	7.14	\$:8	8/8	Ö	25.36	Ö.	25.36 25.36
3 PAR FOR	7.14	74	74	0	21.33	0.	21.33 21.33
4 Pap Pap	7.14	1.1	11	0	3.17	v.	3.17 3.17
5 PAE PAE	7.14	42	42	0	18.10	0.	12.10 12.10
6 KSB 4.0B 7 RSB + 1B	7.14 7.14	37 16	37 16	0	$\frac{10.66}{4.61}$	0. 0.	10.66 10.66 4.61 4.61
8 PES TED	7.14	19	19	ő	5.48	0.	5.48 5.48
9 PED LED	7.14	17	17	ŏ	4.90	o.	4.90 4.90
10 FEE TEE	7.14	20	20	0	5.76	0.	5.76 5.76
11 (47 (7)	7.14	ē.	2	0	.58	Ú.	.5୫ .5୫
12	7.14	13	13	0	3.75	0.	3.75 3.75
1 ()	7.14	5 0	5	0	1.44	0.	1.44 1.44
15 .111	7.14 7.14	3	0 3	0	0. .86	0. 0.	0. 0. .86 .86
16 BELB L100	33.33	74	74	ŭ	21.33	ő.	21.33 84.09
17 3777	33.33	0	0	Ó	0.	0.	0. 0.
18 1111	33.33	14	14	Ų	4.03	0.	4.03 15.91
19 ARLE L100	33.33	58	58	0	16.71	٥.	16.71 78.38
20 ???? 21 5111	33.33 33.33	0 16	16	0	U. 4.€1	0. 0.	0. 0. 4.61 21.62
22 AFLC L100	33.33	10	10	ŏ	2.88	ŏ.	2.88 90.91
23 7777	33.33	ő	č	ŏ	0.	ŏ.	0. 0.
24 \$111	33.33	1	1	0	. 29	0.	.29 9.09
25 APLD 1100	33.33	39	39	0	11.24	0.	11.24 92.86
26 7777	33.33	0	0	0	0.	0.	0. 0.
27 \$444 28 AFLE L100	33.33	3	3	Ü	. 86	0.	.86 7.14 7.20 67.57
29 7777	33.33 33.33	25 0	25 0	0	7.20 0.	0. 0.	7.20 67.57 0. 0.
30 1111	33.33	15	12	ŏ	3.46	ŏ.	3.46 32.43
31 ARLF L100	33.33	4	4	ò	1.15	ó.	1.15 25.00
32 ????	33.33	0	0	0	v.	0.	0. 0.
33 1111	33.33	12	12	O	3.46	e.	3.46 75.00
34 AFLG L100	33.33	12	12	.0	3.46	0.	3.46 63.16
35 ????	33.33	0	O	0	0.	0.	0. 0. 2.02 36.84
36 1111 37 AFLH L100	33.33 33.33	7	7 9	0	2.02 2.59	0. 0.	2.02 36.84 2.59 52.94
38 ????	33.33	ō	0	ŏ	0.	o.	0. 0.
39 1111	33.33	8	8	ŭ	2.31	ő.	2.31 47.06
40 AFLI L100	33.33	12	12	0	3.46	0.	3.46 60.00
41 ????	33.33	0	0	0	0.	0.	0. 0.
42 \$111	33.33	8	8	Ü	2.31	0.	2.31 40.00
43 ARLJ L100 44 ????	33.33 33.33	2	2	0	.58 0.	0. 0.	.58 100.00 0. 0.
45 1111	33.33	ŏ	ŏ	ŏ	0.	ŏ.	o. o.
46 RFLF. L100	33.33	3	3	ŏ	. 86	o.	.86 23.08
47 7???	33.33	0	0	O	u.	0.	0. 0.
48 1111	33.33	10	10	0	2.88	0.	2.88 76.92
49 ARLL L100	33.33	0	0	Ŏ	0.	0.	0. 0.
50 ???? 51 1111	33.33 33.33	0 5	0 5	0	0. 1.44	0. 0.	0.
52 AIA ALTI	12.50	32	32	ő	-9.22	ű.	9.22 43.24
53 AZA ALTZ	12.50	5	5	Ŏ	1.44	ŏ.	1.44 6.76
54 A3A ALT3	12.50	3	3	0	. 86	0.	.86 4.05
55 A5A ALTS	12.50	0	0	0	0.	0.	0. 0.
56 A106 AL10	12.50 12.50	9 23	23	0	2.59	0.	2.59 12.16 6.63 31.08
57 A11A, A610 58 7???	12.50	23 0	0	0	6.63 0.	0. 0.	6.63 31.08 0. 0.
59 1111	12.50	ě	ž	ŏ	. 58	o.	.58 2.70
60 ALE ALTI	12.50	31	31	0	8.93	0.	8.93 53.45
STUR HER 18	12.50	2	2	0	.58	0.	.58 3.45
62 A3B ALT3	12.50	0	0	0	0.	0.	0. 0.
63 A58 ALTS 64 A108 AL10	12.50 12.50	4	4	0	1.15	0. 0.	1.15 6.90 1.15 6.90
65 ALLE AG10	12.50	15	15	0	4.32	o.	1.15 6.90 4.32 25.86
66 77??	12.50	.0	.0	ŭ	0.	ŏ.	0. 0.
67 1111	12.50	è	2	ŏ	.58	o.	.58 3.45
68 AIC ALTI	12.50	ž 3	3	0	. 86	0.	.86 30.00
69 FIZC HLTZ	12.50	0	0	0	u.	0.	0. 0.
70 A3C AL13	12.50	1	1	0	. 29	0.	.29 10.00
71 ASC ALTS 72 A100 AL10	12.50 12.50	0	0	0	.29	0. 0.	0.
73 ALIC AGIO	12.50	5	5	ŏ	1.44	o.	1.44 50.00
74 7777	12.50	ő	ŏ	ō	0.	ŏ.	0. 0.
75 \$555	12.50	0	0	0	0.	0.	0. 0.



D-32

EXHIBIT D-14. (Continued)

74	61D	ALT1	12.50	18	18	U	5.19	0.		5.19	46.15
	621	ALTE		1	1	ŏ	29	0.		. 29	2.56
	630	BLT3		i	i	ŏ	. 29	ő.		29	2.56
	650	fit To		5	5	ŭ	1.44	ò.		1.44	12.02
		fil. 10		5	- 6	ō	1.44	o.		1.44	12.82
81	ALLI			بو	9	Ö	2.59	o.		2.59	23.08
88	3333		12.50	0	0	Ó	0.	0.		0.	0.
83	1111		12.50	0	0	Û	U.	0.		0.	0.
84	ME	64. T.1	12.50	6	6	0	1.73	0.		1.73	24.00
85	ACC	ALTE		1	1	0	.29	0.		.29	4.00
66		ALT3		2	2	0	.58	0.		.53	8.00
67		At 15		4	4	0	1.15	0.		1.15	16.00
8 :3			12.50	5	5	0	1.44	0.		1.44	20.00
89		FIG1 0	12.50	7	7	0	2.02	0.		2.02	28.00
-	????		12.50	0	0	0	v.	0.		0.	0.
91	1114 61F	CH T 1	12.50	0	0	0	0.	0.		Q.	0.
	ASE	BLT1 BLT∂	12.50 12.50	Ü	0	0	0.	0.		0.	0.
94	A3F	ALT3	12.50	ő	ő	Ö	υ. 0.	0. 0.		0. 0.	0. 0.
-	85F	66.15	12.50	ŏ	Ö	Ö	o.	o.		ú.	0.
	BLOF		12.50	1	ĭ	ő	.29	ŏ.		. 29	25.00
97	BLIF	8610	12.50	3	3	ŏ	86	o.		.86	75.00
93	????	11010	12.50	0	Ö	ŏ	0.	ŏ.		0.	0.
	1111		12,50	ű	ŏ	ŏ	o.	ő.		0.	o.
	H16	RLT1	12.50	ž	ž	ŏ	.58	o.		.58	16.67
101	A26	ALTE	12.50	0	ō	Ö	0.	o.		0.	0.
102	636	ALT3	12.50	Ó	Ò	Ü	v.	0.		O.	0.
103	856	ALT5	12.50	3	3	0	.86	0.		. 86	25.00
104	A1 06	FIL 1 0	12.50	2	2	0	. 53	0.		. 58	16.67
105	6116	A610	12.50	4	4	0	1.15	٥.		1.15	33.33
106	7777		12.50	0	0	0 -	0.	0.		0.	0.
107	1111		12.50	1	1	0	.29	0.		. 29	8.33
108	BIH	ALT1	12.50	2	ē	0	.58	0.		.58	22.22
109	HSH	ALTE	12.50	0	0	0	0.	0.		0.	0.
110	A3H	ALT3	12.50	0	0	0	0.	0.		0.	0.
111	R5H	ALTS	12.50	0	0	0	0.	0.		0.	0.
112	AL OH		12.50	2	2	0	.58	0.		.58	22.22
113 114	7777	PG10	12.50	5 0	5 0	0	1.44	0.		1.44	55.56
	1111		12.50 12.50	ŏ	0	0	0. 0.	Ů. O.		0.	0. 0.
	RIL	ALT1	12.50	3	3	ŏ	.86	o.		0. .86	25.00
117	ISA	ALTE	12.50	ĭ	i	ŏ	29	o.		.29	8.33
118	H3I	ALT3	12.50	i	i	ŏ	.29	ŏ.		. 29	8.33
119	A51	ALT5	12.50	ō	ò	ŏ	0.	Ŏ.		0.	0.
	ALOL	HL 10	12.50	í	ĭ	ŏ	. 29	o.		. 29	8.33
121	6111	6610	12.50	4	4	ō	1.15	o.		1.15	33.33
122	7777		12.50	0	0	0	0.	0.		0.	0.
123	1111		12.50	2	2	0	.58	0.		.58	16.67
124	RIJ	ALT1	12.50	0	0	0	0.	0.		0.	0.
125	rej	HLTS	12.50	ŋ	0	0	0.	0.		0.	0.
126	H3J	ALT3	12.50	0	0	0	0.	0.		0.	0.
127	A5J	ALTS	12.50	0	0	0	0.	0.		0.	0.
128	HIOJ	ALIO	12.50	Õ	0	0	0.	0.		0.	0.
129	HILL	A610	12.50	5	5	0	્ર.5લ	0.		_, 58	100.00
130 131	9977		12.50 12.50	0	0	0	0. 0.	0. 0.		0. 0.	0. 0.
132		ALT1				-	.29	o.	•	.29	
133		ALT2	12.50 12.50	0	0	0	0.	0.		0.	33.33 0.
134		HLT3	12.50	ŏ	ŏ	Ö	o.	o.		ŏ.	v.
135		ALTS	12.50	ŏ	ŏ	ŏ	0.	Õ.		o.	ő.
	ni et.		12.50	ĭ	ĭ	ŏ	. 29	o.		.29	33.33
	BLIK	6510	12.50	i	i	ŏ	.29	ō.		.29	33.33
	7777		12.50	ō	ō	Ö	0.	C.		0.	0.
	1111		12.50	Ò	0	0	0.	0.		0.	0.
140		ALT1	12.50	0	0	0	0.	0.		0.	0.
141	AZL	ALTE	12.50	0	0	0	0.	0.		0.	0.
142		ALT3	12.50	0	0	0	v.	0.		0.	0.
143		ALT5	12.50	0	0	0	o.	0.		0.	0.
	ALUL		12.50	0	0	0	0.	0.		0.	0.
145	MILL	A510	12.50	0	0	0	0.	0.		0.	0.
146	7777		12.50	0	0	0	0.	0.		Ŏ.	0.
147	\$111		12.50	0	0	0	0.	0.		0.	0.
~ ~ • •	****		, •					~~~	~ ~ *		~~~~~



D-33

EXHIBIT D-15. LOGIC TREE FOR ANALYZING AREA OF WASTED THROUGH DAMAGE

•••••	• • • • • • •	•••••	• • • • •	••••	•••••	•••••	•••••	•••••
NONE HOUSE NO. HOUSE SYERT	EIE 11.141	66. t. P	(-H D-	51	12	F'T	f'f'
1 LEVO 40 (D.	100.00	12	1209		100,00	0.	100.00	100.00
2 F03 F001	7.14	5	5	U	22.73	0.	22.73	22.73
3 Par Par 4 Par Par	7.14 7.14	9	9	Ü	40.91 U.	Ů. O.	40.91 0.	40.91
5 FRE FRE	7.14	2	٤	ő	9.09	0.	9.09	9.09
6 I'SE FIF	7.14	1	1	Ü	4.55	0.	4.55	4.55
7 1/20 1/20	7.14	5	5	0	9.09	0.	9.09	9.09
9 KES FED 9 KES FED	7.14 7.14	0	() ()	0	0. 0.	0. 0.	0. 0.	0. 0.
10 HE FEE	7.14	ĭ	i	ő	4.55	0.	4.55	4.55
11 UPC UPC	7.14	0	0	0	0.	0.	0.	0.
12 LMC LMC	7.14	1	1	Û	4.55	0.	4.55	4,55
13 COM COM	7.14	1	1	0	4.55 0.	0. 0.	4.55 0.	4.55 0.
15 1111	7.14	ŏ	ŏ	ŏ	õ.	o.	ŏ.	ŏ.
16 NFLA L100	33.33	4	4	0	18.18	O.	18.18	80.00
17 7922 18 1111	33.33 33.33	0	0	0	0. 4.55	0. 0.	0. 4.55	0.
19 AFLE L100	33.33	1 8	i 8	0	36.36	0.	36.36	20.00 88.89
20 7777	33.33	ő	ō	Ŏ	0.	ō. ·	0.	0.
21 1111	33.33	1	1	0	4.55	0.	4.55	11.11
22 APLC L100	33, 33	0	ů	()	. 0.	0.	0.	0.
23 ???? 24 1111	33. 33 33. 33	0	0	0	0.	0. 0.	0. 0.	0. 0.
25 MELD L100	33.33	ž	2	ŏ	9.09	ŏ.	9.09	100.00
26 ????	33.33	0	0	0	0.	0.	0.	0.
27 1111 28 AFLE L100	33.33 33.33	0	0	0	0. 4.55	0. 0.	0. 4.55	0. 100.00
29 7777	33.33	ò	ó	ő	0.	0.	0.	0.
30 1111	33.33	0	0	Ú	0.	0.	o.	o.
31 AFLF L100	33.33	2	2	0	9.09	0.	9.09	
32 ???? 33 1111	33.33 33.33	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
34 AFL6 L100	33.33	ŏ	ŏ	ŏ	0.	o.	o.	0.
35 7171	33.33	Ö	Ö	Ö	0.	0.	0.	0.
36 1111	33.33	0	0	Ú	0.	0.	0.	0.
37 AFLH L100 38 ????	33.33 3 3. 33	0 9	0	0	0. 0.	0. 0.	0. 0.	· 0.
39 1111	33.33	ŏ	ŏ	ő	o.	ŏ.	ŏ.	o.
40 AFLI L100	33.33	0	0	0	0.	0.	0.	0.
41 ????	33.33	0 1	0	0	0. 4.55	0.	0.	0.
43 FFLJ L100	33.33 33.33	ò	0	0	0.	0. 0.	4.55 0.	0.00
44 7777	33.33	0	0	ŏ	v.	0.	0.	0.
45 1111	33.33	0	0	Ó	0.	0.	0.	0.
46 AFLA L100	33.33	1	1	0	4.55	0.	4.55	100.00
47 7??? 49 1111	33.33 33.33	0	0	0	0. 0.	0. 0.	o. o.	0. 0.
49 APLL 1100	33.33	ŏ	ŏ	ŏ	ō.	o.	o.	ŏ.
50 7???	33.33	0	0	0	0.	0.	0.	0.
51 1111	33.33	1	1	0	4,55	0.	4.55	100.00 0.
52 AIA ALTI 53 AZA ALTZ	12.50 12.50	O U	0	ŏ	0. 0.	0. 0.	0. 0.	o.
54 838 ALT3	12.50	0	Ŏ	0	0.	0.	0.	0.
55 A5A ALTS	12.50	1	1	0	4.55	0.	4.55	25.00
56 AICA ALIO 57 AIIN AGIO	12.50 12.50	3	0 3	0	0. 13.64	0. 0.	0. 13.64	0. 75.00
53 7777	12.50	ŏ	3	ŏ	0.	ŏ.	0.	0.
59 1111	12.50	0	0	0	0.	0.	0.	0.
60 AIR ALTI	12.50 12.50	4	4	0	18.18	0.	18.18 0.	50.00 0.
62 A3D ALTS	12.50	ő	ŏ	0	0. 0.	0. 0.	ŏ.	0.
63 ASB ALTS	12.50	1	1	0	4.55	0.	4.55	12.50
64 RIOF AL10	12.50	1	1	0	4.55	0.	4.55	12.50
65 ATTE AGTO 66 ????	12.50 12.50	2	5	0	9.09 0.	0. 0.	9.09	25.00
67 \$111	12.50	ŏ	0	0	0.	ŏ.	o.	0.
68 AIC ALTI	12.50	0	0	0	0.	0.	0.	0.
69 A2C ALT2	12.50	0	0	0	0.	0.	0.	0.
70 A30 ALT3 71 A50 ALT5	12.50 12.50	0	0	0	0. 0.	0. 0.	0. 0.	0.
72 RIOC RE 10	12.50	0	ŏ	0	0.	0.	0.	0.
73 ALIC AG10	12.50	0	Ú	0	0.	0.	0.	0.
74 7177 75 1116	12.50 12.50	0	0	0	0. 0.	0. 0.	0. 0.	0. 0.
1 3 1 7 1 7	16170	v	v		٧.	**		**



EXHIBIT D-15. (Continued)

76	ALD	ALT1	12.50	. 1	1	0	4,55	0.	4.55 50.00
77	630	60.12	16.50	ò	ò	ő	0.	o.	0. 0.
			10 00		-	•			
	H BD	60.13	12.50	0	0	0	0.	0.	0. 0.
79	FIFT.	BLT5	12.50	Ü	Û	O	0.	0.	o. o .
8.0	ALOD	FIL 1 0	12.50	0	0	0	0.	0.	0. 0.
81	6110	6651.0	12.50	1	1	O	4.55	0.	4.55 50.00
83	2717		12.50	ō	ō	ŏ	0.	0.	0. 0.
83	1111		12.50	0	0	0	U.	0.	
8:4	HIE	HL11	12.50	Ú	0	0	Q.	0.	o. o.
85	MEE	FILTE	12.50	0	0	0	Ú.	o.	0. 0.
86	ABE.	MLT3	12.50	0	0	U	0.	0.	0. 0.
8:7	ASE	ALTS	12.50	Ü	Ŏ	ŏ	0.	o.	0. 0.
	MIGE		12.50	ò	ŏ	ő		ŏ.	ŏ. ŏ.
							0.		
6:3	MITE	H01.0	12.50	1	ı	0	4.55	0.	4.55 100.00
90	2333		12.50	Ü	0	U	0.	0.	0. 0.
91	1111		12.50	0	0	0	v.	0.	0. 0.
92	ALF	HLT1	12.50	0	0	0	0.	٥.	o. o .
	ASF	BLIZ	12.50	0	Ó	Ó	v.	0.	0. 0.
94	R3F	HLT3	12.50	ò	Ŏ	ŏ	0.	Ö.	o. o.
-				-					
95	ASE.	ALTS	12.50	0	0	0	0.	0.	0. 0.
9€.	61 0F		12.50	0	0	0	0.	0.	0. 0.
97	ALIF	6610	12.50	ĉ	2	0	9.09	0.	9.09 100.00
98	7777		12.50	Ú	0	Ú	υ.	0.	0. 0.
99	1111		12.50	Ó	ō	Ö	0.	0.	0. 0.
	816	fiLT1	12.50	ŏ	ŏ	ŏ	ŏ.	ŏ.	0. 0.
101	A26	ALTE	12.50	Ö	ò	ŏ	o.	o.	Ŏ. Ŏ.
102	636	HLT3	12.50	0	0	0	0.	0.	0. 0.
103	A56	ALT5	12.50	0	0	0	Q.	0.	0. 0.
104	0106	6L10	12.50	0	0	0	0.	0.	0. 0.
105	A116	6610	12.50	Û	0	0	c.	0.	o. c.
106	3333		12.50	0	Ó	Ú	0.	0.	0. 0.
107	1111		12.50	ō	ò	Ō	0.	0.	0. 0.
103	AIH	ALT1	12.50	ò	ŏ	ŏ	Ö.	ō.	0. 0.
109	HSH	MLT2	12.50	0	0 ,	0	0.	0.	0. 0.
110	613H	HLT3	12.50	0	0	0	u.	0.	0. 0.
	11011			U	U	ŧı	0.	0.	0 0
112		111.12	10.00						0. 0.
		14.10	12.50	Ú	Ü	0	u.	0.	ų. O.
113	A1 111	1051.0	12.50	0	0	0	0.	0.	ů. o.
114	7777		12.50	Û	0	Ú	v.	0.	0. 0.
115	1111		12.50	0	0	0	0.	0.	0. 0.
116	ALL	RLT1	12.50	Û	0	0	0.	0.	Ú. Ö.
117	ISA	ALT2	12.50	ò	Ŏ	Ö	Ü.	ŏ.	Ŏ. Ŏ.
118	A31	ALT3	12.50	ŏ	ŏ	ŏ	0.		
	A51							0.	0. 0.
		BLTS	12.50	0	0	0	0.	0.	0. 0.
	6101	fil 10	12.50	Û	Ü	0	0.	0.	0. 0.
151	RIII	6610	12.50	Ú	0	0	u.	0.	0. 0.
123	7777		12.50	Ú	Ū	0	v.	0.	0. 0.
123	1111		12.50	0	0	0	0.	0.	0. 0.
	61.1	RLT1	12.50	Ů	Ò	Ö	ó.	Ŏ.	0. 0.
	AZJ	ALTE	12.50	ŏ	ŏ	ŏ	0.	ŏ.	Ŏ. Ö.
126	H3J	ALT3	12.50	ŏ	ŏ	ů			
				-			0.	0.	0. 0.
127	A5J	BL15	12.50	0	0	0	Q.	0.	0. 0.
128	HIOJ		12.50	0	0	Q	v.	0.	0. 0.
129	ALLJ	6610	12.50	0	0	0	0.	0.	0. 0.
130	3333		12.50	0	0	0	U.	0.	0. 0.
	1111		12.50	0	Ö	0	Ü.	Õ.	0. 0.
132	ALL	RLT1	12.50	ŏ	ŏ	ŏ	o.	ŏ.	0. 0.
	880	ALTE	12.50	ŏ	ŏ	ŏ		ŏ.	0. 0.
	BSK.						0.		
		ALT3	12.50	0	0	0	Ű.	o.	0. 0 .
	f151.	ALTS	12.50	Ü	٠ 0	O	u.	0.	0. 0.
	A1 91:		12.50	0	0	0	0.	0.	0. 0.
	ALIK	A610	12.50	1	1	0	4.55	0.	4.55 100.00
	7777		12.50	0	0	0	U.	0.	0. 0.
	1111		12.50	Ü	Ŏ	ŏ	ŭ.	o.	o. o.
140		BLT1	12.50	ő	ŏ	ŏ	o.	o.	0. 0.
141		ALTE	12.50	ŏ	ŏ				
						0	0.	0.	0. 0.
142		ALT3	12.50	0	0	0	0.	0.	0. 0.
143		ALTS	12.50	0	0	0	0.	0.	0. 0.
	RIOL		12.50	0	0	0	0.	٥.	0. 0.
	ALIL	0610	12.50	0	0	0	0.	0.	0. 0.
146	7777		12,50	0	0	0	v.	0.	0. 0.
	1111		12.50	Õ	Ď	ŭ	o.	0.	0. 0.
			******						*****

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